

GUTHRIE
ON
WOUNDS AND INJURIES
OF THE
ABDOMEN.

26,099/C/1

LIBRARY

OF THE

Charing Cross Hospital Medical School.

Case

X

N

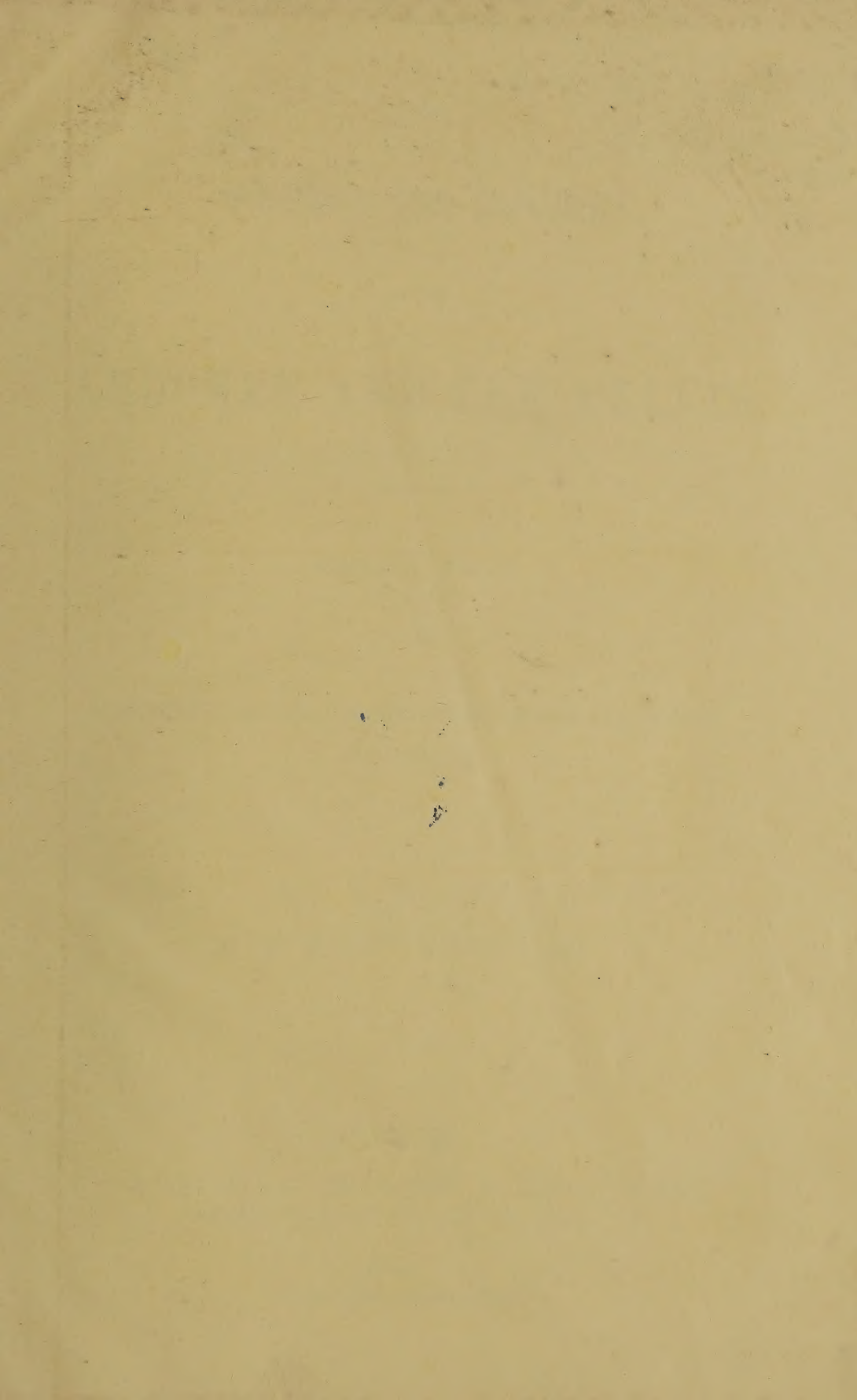
Shelf

3

4

No.

12



W. W. W. W. W.
with the Authors
butryand

ON

WOUNDS AND INJURIES

OF THE

ABDOMEN AND THE PELVIS;

BEING THE

SECOND PART

OF THE

LECTURES ON SOME OF THE MORE IMPORTANT POINTS
IN SURGERY.

By G. J. GUTHRIE, F.R.S.

LONDON:

J. CHURCHILL, PRINCES STREET, SOHO.
HENRY RENSHAW, 356, STRAND.

1847.

[PRICE THREE SHILLINGS.]

304964

LONDON:
PRINTED BY A. MUNRO, 6, NEW TURNSTILE,
Lincoln's Inn Fields.



ON concluding my Lectures "On Some of the more Important Points in Surgery," in July last, I promised to recommence them in November, in order to leave a record of the practice pursued in the Treatment of Wounds and Injuries of the Chest, the Abdomen, and the Pelvis, during the Peninsular War. Rendered unequal to the performance of this promise, by the greatest calamity which could possibly have befallen me, I have drawn some consolation from beguiling away my winter evenings in preparing a part of them for the press, with the hope and the belief that they may be useful, not only by pointing out what has been done to the present time, but by drawing attention to what ought perhaps hereafter to be done under similar circumstances.

4, BERKELEY STREET, BERKELEY SQUARE.

10th March, 1847.

LECTURES

ON SOME OF THE MORE

IMPORTANT POINTS IN SURGERY.

PART II.

ON WOUNDS AND INJURIES OF THE ABDOMEN.

LECTURE I.

Three kinds of wounds and injuries of the abdomen; The formation of ventral hernia, the sequence of bruises, and wounds of the abdominal parietes; Case of severe bruise of the abdominal parietes in the left iliac region, by a piece of shell, followed by ventral hernia; Case of ditto, from a blow with the end of the spanker-boom; No rupture of the muscular fibres distinguishable in these cases, and their absorption, a process subsequent to the injury; Abscesses in the abdominal parietes; The strength of the fibrous structure of the peritoneum the cause of their not bursting into the abdominal cavity; Case of psoas abscess, the matter ascending from Poupert's ligament, and burrowing between the peritoneum and abdominal muscles; Case of extensive musket-ball wound of the muscular parietes of the abdomen, with exposure of the peritoneum, healing by granulation; Distinction between the orifice of entrance, and that of exit, of a musket-ball wound; Oblique musket-ball wounds of the abdominal parietes; Coursing of the ball under the skin; Lodgment of a musket-ball deeply in the wall of the abdomen; Formation of a sac of dense cellular membrane around a ball, when retained in situ a long period of time; Stabs of the wall of the abdomen; Their reputed danger, dependent on the occurrence of suppuration, or the retention of the pus between the muscles, or in or under their aponeurotic sheaths; Prevention of suppuration by enlargement of the wound; Treatment of stabs of the abdominal parietes; Case of sabre wound of the abdominal parietes and stomach, followed by a small hernia of that organ; Rupture of the internal organs of the abdomen from external injury; Case of rupture of the liver from a fall from a horse; Case of rupture of the small intestines from a horse's kick; Comments

on the treatment; Case of rupture of the small intestine, from a blow with the wadding of one of the park guns; Case of rupture of the small intestine, from a fall on a man's thumb; The first effect of ruptured intestine the extravasation of the contained gas; Abdominal swelling and tension a distinguishing symptom of ruptured intestine; Jobert de Lamballe's case of ruptured intestine from external violence—recovery; death from hæmoptysis; Symptoms of rupture of the fixed viscera; Death generally occurs from hæmorrhage; Case of rupture of the kidney from a cannon-shot; Case of injury of the abdomen from a cannon-shot, followed by fatal peritonitis; Baron Larrey's cases; Necessity for a well-directed medical, as well as surgical, treatment of all these injuries; Imperfect union of the muscular parietes of the abdomen after an incised wound; Ventral hernia following the operations for ligature of the common or external iliac; Question as to the propriety of employing sutures through the muscular parts in wounds of the abdomen; Opinions of Cheilus, South, Von Graefe, and Weber, on the application of ligatures in treating these wounds; Evils of the practice of employing ligatures; Recommendation to use the continuous suture, passed through the skin and cellular tissue only; Advantages of the practice; Additional support to be afforded by strips of adhesive plaster, and not by a bandage; Position of the patient to be such, that the opposed surfaces of the peritoneum may unite together by the adhesive process; Excess of inflammation causes great secretion of serum, and shreds of lymph; Absolute quietude to be observed; Purging equally injurious in such cases, as after the operation for strangulated hernia; When a stool is passed, any unnecessary action of the abdominal muscles must be prevented; The

practice of bleeding immediately on the receipt of a stab, condemn'd; not to be employed until after re-action has taken place, and then according to the symptoms; The application of leeches; Symptoms requiring the loss of blood; The operations for the removal of ovarian tumours; Wounds of the linea alba can unite so as to resist a hernial protrusion; Large openings may be made through it into the abdomen with impunity; The results of Dr. F. Bird's operations for ovarian tumours; Penetrating wounds of the abdomen, without injury to the viscera, when properly treated, not so dangerous as generally supposed; Penetrating wounds of the belly, with injury to the contained viscera; Mr. Green's case of penetrating wound by an iron spike, with laceration of the right common iliac vein; Case of penetrating wound by a ramrod; M. Besson's case of penetrating wound by an iron spindle; M. Scarutti's case of wound of the thigh and abdomen, by falling on a stake; Penetrating musket-shot wounds of the abdomen; Usually followed by protrusion of omentum or intestine; Treatment of the omentum, when protruded; Treatment of omentum, when external to the abdomen, the opening in the latter being too small for its restoration to its proper cavity; Enlargement of the wound in the skin and muscles requisite, but not of that in the peritoneum; Small wounds of the peritoneum not dangerous, when properly covered by the neighbouring healthy parts; Large ones followed by disastrous consequences; Case of penetrating wound of the abdomen, with protrusion of the omentum; Baron Larrey on the treatment of protruded omentum; Case of lance-wound of the abdomen, with protrusion of the omentum; Case of penetrating wound, with protrusion of the omentum, requiring enlargement of the wound in the skin and aponeurotic expansion; Case of musket-shot wound of the abdomen, with considerable protrusion of omentum; M. H. Larrey's case of penetrating wound of the abdomen, with protrusion of omentum; Dr. Hargrave's case of penetrating wound, with protruding omentum, the latter being removed by ligature; Mode of returning protruded omentum, intestine, or mesentery; Treatment of torn, jagged, suppurating, or gangrenous omentum; Intestine, when protruded, without having been wounded, to be returned in all cases, unless mortified; Disapproval of the directions, usually given to reduce protruded intestine; Adhesion between the wounded peritoneum and the intestine which has been protruded, should be obtained; Cases of penetrating wound, with protrusion of intestine; Protrusion of wounded intestine; A mere puncture, or small stab, of no consequence; Case of wounded and protruded intestine; Correct prognosis in cases of wounded intestine, almost impossible; Littre's case of recovery after severe wounds of the liver and intestine; The probability of the effusion of the contents of a wounded intestine, dependent on the size of the wound; The consequences of the effusion, when large or small; Large effusion of blood from rupture of the liver or spleen; Small effusions may be confined to one spot, and removed by absorption, or discharged

externally, or by the bowels; Cases of penetrating wound of the abdomen, followed by circumscribed abscess, or by general formation of matter.

GENTLEMEN,—Wounds and injuries of the abdomen are essentially of three kinds:—1. Affecting the paries, or wall. 2. Opening or extending into its cavity. 3. Wounding or injuring its contents.

The wall of the belly, in consequence of its being principally composed of three layers of muscles, more or less tendinous, extending from the lateral parts towards the front, and by their aponeurotic or tendinous expansions over it, is when severely hurt, liable to a permanent defect which has not been so especially alluded to as it deserves, as the ordinary result of a severe bruise, excepting in cases where the muscular fibres have been ruptured. It is the formation of a ventral rupture. A division of the wall to any extent, by a sharp cutting instrument, is usually followed by a similar consequence; and it never fails to occur in the openings made by a musket-ball penetrating into, or passing through the cavity.

CASE 1.—Captain Tarleton, of the 7th, or Royal Fusiliers, was struck on the left iliac region, by a large flat piece of a shell, at the Battle of Albuhera, in 1811. The surface was not abraded, although the iron caused a very severe and painful bruise; the whole of that side of the belly becoming quite black, and the remaining part much discoloured. This gentleman, who subsequently suffered but little, recovered under an ordinary, and perhaps careless treatment. Some months afterwards, he drew my attention to the part, and I then found that the whole of the muscular portion of the wall had been removed by absorption, to the extent of the immediate injury from the piece of shell, the tendinous parts alone remaining under the integuments. These appeared to be much thinner than usual, and protruded on any effort, constituting a circular-shaped ventral rupture, with a large base, and requiring the application of a pad and bandage for its repression.

CASE 2.—Mr. Smith, a deputy-purveyor, while disembarking stores from a small vessel in the Tagus, received a blow on the side of the fore-part of the belly, from the end of the spanker-boom, which, in swinging round, knocked him down, and gave rise for some time to much inconvenience. He shewed the part to me in Lisbon, in 1813, in consequence of the formation of a ventral hernia, to the extent of the spot originally injured. In neither of these cases was such a result expected; no rupture of the fibres of the muscles was distinguished at the time; and it was supposed that the sufferers would recover, without any permanent defect. The absorption of the muscular fibres was, therefore, a subsequent process; and whether this result may or may not be prevented in similar cases, by a more

active or a longer-continued treatment, with the early application of a retaining bandage, is to be ascertained. It may be that some muscular fibres were actually ruptured, and others bruised, in these cases; but the extent of the absorption was in the end much greater than the apparent injury in the first instance, would seem to have warranted under any circumstances.

Abscesses form from neglected injuries of this kind, and give rise to the most serious apprehensions of their bursting into the cavity of the abdomen, which, however, they have not done in any cases I have seen, and very rarely do, I believe in any case. The safety of the peritoneum, and its capability of affording sufficient resistance to the progress of the matter through it, seem to depend upon the strength of the fibrous structure on its outer or muscular side; the inner or really serous surface being very delicate, and offering but little resistance to the application of any moderate degree of force.

CASE 3.—I saw, when in British North America, in 1805, a psoas abscess, which had descended as far as Poupart's ligament, when the matter it contained passed upwards between the peritoneum and the muscular wall of the belly, and gave rise to an external collection of matter. The patient ultimately died from general irritation, the matter finding its way into the bladder, but not into the cavity of the abdomen, the strength of the peritoneum having been its safeguard.

CASE 4.—Lieutenant Colonel Grey, of the 5th Regiment, now a Major General in India, was wounded at the assault of Ciudad Rodrigo, in 1812, by a musket ball, on the left side and forepart of the abdomen near the crest of the ilium; it made a wound about four inches in length, cutting away the muscles of the abdominal wall so deeply as to lead to the exposure, and as I feared, to the ulceration of the peritoneum, when the sloughs should separate. It did however no such thing; granulations, on the contrary, sprang up from the bottom and sides of the wound, which gradually closed in, and healed without further difficulty. I have seen the same thing occur in so many instances, as to leave no doubt of the great, and generally effective resistance the peritoneum is enabled to make against the ulcerative process, when in its immediate vicinity.

It has been supposed, theoretically, to be a matter of importance to discriminate between the orifice of entrance of a ball passing through the abdomen or its wall, and that of its exit. I believe it to be practically a matter of indifference, although the part on which the ball impinges is usually distinguished by a more circular and depressed appearance, whilst the opening of exit more frequently resembles a tear or slit, the edges of which are rather disposed to protrude.

A ball striking obliquely against the wall of

the abdomen, has been said to run sometimes nearly round under the skin, or between the muscles and the peritoneum, proceedings upon the recurrence of which, little expectation need be placed. It may, however, do something of the kind for a considerable distance, passing even over, or between the spinous processes of the vertebræ behind. In such cases, when they actually occur, the course of the ball will usually be marked by a line on the skin, more or less of a reddish blue colour; and the constitutional alarm, if it should occur at all, will subside early. A ball may, however, pass under and between the muscular layers of the wall of the belly, (or run for several inches nearer to the peritoneum,) giving rise to great anxiety, until the sloughs have separated from the openings of entrance and of exit, at which parts they prevail to a greater extent, than in the middle of the track of the projectile. In some few instances an opening will require to be made in the middle of this track or course of the ball for the evacuation of pus, or of other extraneous matters which may have been detained in it.

When a ball lodges in the wall of the abdomen, and is deeply situated, it sometimes escapes notice, and when found, is often better let alone, unless it prove troublesome. When it approaches the surface, it may be removed if it cause inconvenience. When removed after the lapse of twenty or more years, I have always found some dense cellular membrane forming a sac around and adhering to the ball, which is usually more or less flattened and irregular.

Injuries of the wall of the abdomen, from cuts or stabs affecting the muscular and tendinous parts, are said to be frequently troublesome, and even dangerous, from their giving rise to pain, vomiting, and severe general derangement. This only occurs when suppuration takes place, and from some accidental circumstance the matter does not find a ready exit, but collects between the muscles, or within or under their aponeurotic sheaths. This is indicated by the pain and swelling of the part proceeding sometimes to the formation of an abscess, which ought to be prevented, if possible, by an early enlargement of the wound, so as to remove the cause of irritation and the obstacle to the free discharge of the secreted matter. If the swelling should become prominent in a more convenient situation than the spot of injury, it should be opened at that part.

In these and in all other serious injuries of the abdomen, the recumbent position with a relaxed state of the muscles, should be observed for several days at least. The antiphlogistic plan of treatment should be fully enforced, especially by leeching, bleeding, and spare diet, and in due time the part should be supported by a proper bandage.

CASE 5.—The late General Sir John Elley was

wounded in the last charge of heavy cavalry at Waterloo, by the point of a sabre, which entered nearer the extremity of the ensiform cartilage than the umbilicus, causing a wound about two inches in length, penetrating the stomach. From this he recovered in due time without any severe symptoms, but with a small hernia of that organ, which remained until his death, giving rise occasionally to some gastric inconvenience, when he did not keep a gentle pressure upon it by a retaining bandage.

Severe blows, or contusions from falls, or from the concussion of foreign bodies, may give rise, not only to injury of the internal parts of the abdomen, followed by inflammation—but to rupture of the hollow as well as of the more solid and fixed viscera, and death.

CASE 6.—A soldier, in the 13th Lt. Dragoons, was thrown over his horse's head, in 1805, at Sandwich, in Kent, on a field-day, in consequence of the horse having had his foot caught in a rabbit-hole. He complained only of the shock he had received, not of any particular blow or injury, and declared he should soon be well again. He however gradually sank, and died without a groan. On examination after death, a large quantity of blood was found extravasated in the cavity of the abdomen, the liver whence it came having been ruptured in two places.

CASE 7.—William Fletcher, 18th Hussars, a healthy man, 37 years of age, received a kick from a horse, immediately above the os pubis, on the 15th of April, 1810 (about a league from Cartaxo, on the Tagus); great tension of the belly soon followed, with excessive pain and vomiting. The pulse rose rapidly. He was bled to syncope twice during the day, to the extent of $\frac{3}{4}$ xvi. each time. In the evening he was removed to Cartaxo, and taken into hospital; the pain continued, accompanied by retching, without much vomiting; the abdomen was constantly fomented with hot water; an injection was thrown up, and two ounces of infusion of senna with salts were given every two hours.

16th, Horâ 6 A.M.—There is less tension of the abdomen, and not so much pain; bowels not open; pulse quiet; has not vomited for four hours; made water freely three times during the night. Cont. mist. laxativa omni horâ, donec alvus soluta erit.

Horâ meridiæ: passed a small, slimy stool; pulse increasing rapidly. Mitte sang. e brachio ad $\frac{3}{4}$ xvi. Rept. inject.; sumatol. ricini $\frac{3}{4}$ ss. statim.

Horâ 4 P.M.—Has gone to stool three times, but with little effect; considerable tension, and pain of the abdomen on pressure; pulse small, frequent, and irregular; has vomited several times during the day.—Rept. inject.; cont. fatus.

Horâ 10 P.M.—The stomach has become more irritable; rejects every thing; pain and tension of the abdomen increased; pulse sinking; re-

mained perfectly sensible, and, at 3 o'clock A.M., expired.

Appearances on Dissection.—The peritoneum contained a very large collection of fluid, of a very offensive fœtor, slightly tinged with bile, and partaking of a fœcal nature, but was less inflamed than the omentum or mesentery; the bowels themselves appeared to have suffered to the greatest extent; and, on accurately examining the small intestines, a laceration was discovered in the ileum, which doubtlessly was the cause of death.

(Signed) W. CHAMBERS, Surgeon.

The purgatives in this case did no good, if they did not do mischief. The tension, or tympanitic state of the abdomen, was well and early marked in this, as in the two succeeding cases, and may be considered to be almost pathognomonic of laceration.

CASE 8.—A boy was brought to me at the Westminster Hospital, many years ago, in consequence of having fallen from a tree, in which he had seated himself to see the guns fired in the Park, the wadding of one of them having struck him in the belly. The parietes were uninjured, and hardly discoloured. The shock was considerable, and re-action was followed by swelling and tension of the abdomen, with pain, and other symptoms of inflammation, which terminated in death. On the examination of the body, the small intestine was found to have been ruptured by the blow, and considerable extravasation had taken place into the general cavity of the abdomen.

CASE 9.—A child, just able to walk, was placed under my care, in the Westminster Hospital, in consequence of its having received some injury on the side of the belly, from having been tossed up into the air by its father, with his right hand, and caught in its descent in the crutch, formed by the thumb and fingers of the left, on the thumb of which it unfortunately at last fell; this caused the child great pain, which was soon followed by considerable swelling and inflammation of the belly, of which it died. On examination after death, the small intestine was discovered to have been ruptured by the end of the thumb, from which extravasation of its contents into the abdomen had ensued.

The first effect of a rupture of the intestine must be the extravasation of such gas as may be contained in, or secreted from it, giving rise to the sudden swelling, as well as to the sudden effusion of part of its contents, but which, from the support of continuity, and of the general pressure of the abdominal parietes, is, perhaps, more gradually poured out. M. Jobert de Lamballe, in his *Traité Théorique et Pratique des Maladies Chirurgicales du Canal Intestinal*,¹ considers the rapid tension and swelling of the belly to be a distinguishing symptom of rupture of the intestine; and he relates a very interesting case in

point, which Messrs Paillard and Marx, in editing the Clinical Lectures of the Baron Dupuytren, have thought it right to reproduce at page 416 of their work.

CASE 10.—N——, 22 years of age, was knocked down by a carriage, one wheel of which went over his abdomen, without injuring the external parts. Carried immediately to the Hospital St. Louis, the belly was found to be distended, stretched, and sounding like a drum when struck, with scarcely any uneasiness. He was bled and leeches several times in succession, strictly dieted and treated, and had nearly recovered, when he was seized with hemoptysis, of which he died after being two months in the hospital. The small intestine was found adhering to the omentum, and with it to the peritoneum lining the last of the false ribs. On carefully examining the inside of the intestine, a sort of projection was seen in its cavity, which proved to be the omentum, which had passed through a rupture of the bowel to the extent of about the third of an inch. The plug and the adhesion thus formed did not take place sufficiently early to prevent the effusion of air from the bowel, although time enough to prevent the extravasation of its contents. The recovery although purely accidental, is nevertheless, highly deserving of remembrance, as shewing the propriety of never abandoning a patient for an instant, however bad may be the symptoms, or the prognosis.

CASE 11. A Spanish soldier was brought to me, near the conclusion of the battle of Toulouse, in consequence of having been struck obliquely by a cannon-shot on the right side of the abdomen and back, which appeared to be badly bruised, although no abrasion of the skin had taken place. The shock was however great; he was unable to move his limbs, and appeared likely to die, which he did in fact do in the course of the night, having passed bloody urine, but without any reaction having taken place. On making an incision through the skin, which was then quite a blue-black, although not torn, all the soft parts were found reduced to a state approaching to the appearance of jelly: the spine was injured, the right kidney ruptured, and the cavity of the abdomen full of blood.

CASE 12. A soldier of the 40th regiment, was struck by a ricochet cannon-shot, on the last day of the siege of Ciudad Rodrigo. He saw the ball, which destroyed his left fore-arm, so as to render amputation necessary, strike the ground a little distance from him, before he was himself injured. He thought from the sort of shock he had received, that it had also struck his belly; but this I should not have credited, if it had not been for a bruise across the umbilical region, without actual abrasion of the integuments, on which account my attention was drawn to him on the fourth day after the injury, at the

hospital of Aldea Gallega. He had been bled in consequence of complaining of pain, and from the quickness of pulse and fever which had ensued, and which were attributed to irritation after amputation. The belly was swelled and tender under pressure. Calomel, antimony, and opium, were given; he was bled again, and blisters were applied; the stump took on unhealthy action, and he died a fortnight after the receipt of the injury. The abdomen, when opened, was found to contain a quantity of opaque serous fluid, mixed with shreds of coagulable lymph. The omentum and intestines were of a dark colour, and loaded with blood; distinctly indicating the chronic state of inflammation which had taken place. Baron Larrey has related in the third volume of his Campaigns and Memoirs, three cases of a similar nature. The first two died; one from effusion and fever, on the fifteenth day. In the second, a ricochet shot, at its second or third bound, had grazed the skin of the abdomen. He suffered little at the moment; but the injury was sufficient to give rise, after several weeks, to effusion into the cavity, when the Baron evacuated by a trocar, a quantity of bloody fluid, which deposited after standing a little time, a quantity of fibrine. Thinking, from the feel of the part, that some coagulated blood remained behind, he enlarged the opening in the abdomen, and thereby allowed a large quantity of coagulated blood, &c., to escape. There were for a time great hopes of a cure, but this passed away; he became dropsical, was tapped several times, and in all probability died. The third case recovered, without effusion or any immediate mischief, although he was invalidated as unfit for further service.

These peculiar instances shew the strict attention which ought to be paid to all such cases, until every trace of mischief has been removed, and demonstrate the necessity of a well-directed medical, as well as surgical treatment of all these injuries.

When the fixed viscera are ruptured by severe blows, such as those received by falls or from cannon-shot, the symptoms are not only those of inflammation of the peritoneum, if the patient should survive long enough; but of the organ itself, and of lesion of the function it performs. The sufferers usually however die from hemorrhage, and not from inflammation, as they do not live long enough to allow of its effective formation.

When an incised wound is made through the wall of the abdomen to any extent, except perhaps in the linea alba, the muscular parts are rarely found to unite in a more perfect manner than when they are ruptured and bruised. The observations I had made on this subject during the war, were confirmed by those cases in which I have tied the common iliac or the external iliac artery, by an incision on the face of the lateral part of the abdomen, the patients recovering afterwards;

the incision through the muscular wall did not remain united, although union appeared to have taken place in the first instance, and a herniary protrusion formed in all, in the course of the greater part of the line of the wound.

The almost constant occurrence of this non-union of the divided intermingled muscular and tendinous parts constituting the wall of the belly, except by cellular membrane, led me to doubt the propriety of introducing ligatures through these parts; for the purpose of keeping them in apposition, when such object, even when at first accomplished, did not lead to the permanent cohesion of the parts, whilst it exposed the sufferers to all the dangers which the irritation of sutures commonly occasions.

Chelius, Section 513, of the translation by Mr. South, who jointly are the latest authors and commentators on this part of European surgery, approves of the practice of sewing the divided muscles together. Chelius recommends "several flat ligatures, to be introduced through the skin and muscles, the needle being placed close to the muscular surface of the peritoneum." Graëfe, Section 514, is declared to be of the same opinion, he recommending, however, that a soft tape should be substituted for a ligature. Reference is made to Weber in support of this practice, to which Mr. South does not raise any objection. Chelius is, however, perfectly aware of the evils which may result from it, and says, "If after union of the wound of the belly with stitches, vomiting and hiccough occur, if the wound inflame smartly, and these symptoms do not yield to the antiphlogistic treatment, and to the use of opium, the threads must be loosened or entirely removed, and the wound merely held together with sticking-plaster and bandage." The danger thus incurred appears to me to be best obviated by refraining altogether from the introduction of ligatures through the muscular and tendinous parts of the wall, more particularly as it does not appear that permanent cohesion is generally effected by them, and the advantages which may be supposed to be derived from the greater degree of apposition occasioned by the ligatures, are more than counterbalanced by the evils which the traction on muscular fibre occasions. No London surgeon in the present days stitches the divided ends of muscles together except in the abdominal parietes, when the peritoneum is also divided, and the sooner the practice is abolished in that part—in wounds of moderate extent—the better it is my belief it will be for the sufferers.

The practice I have recommended in my lectures for the last thirty years, in all simple wounds of the wall of the belly of moderate extent, is to bring the edges of the wound together, by means of a small needle and a fine silk thread passed through the skin, and the loose cellular membrane only, which is in contact with

it, by a continuous suture without puckering, precisely in the manner a tailor would fine-draw a hole in a coat, or a lady a cut in a cambric pocket-handkerchief. This gives a certain degree of support to the parts beneath, and if proper attention be paid to maintaining a well-regulated relaxed position of the muscles, no great separation takes place in wounds of a reasonable extent, and little or none in a wound of smaller dimensions. An effective support should be also given by strips of adhesive plaster extending to some distance around the body; a bandage rarely does good, and will assuredly do mischief, unless it be very carefully applied and watched, so as only to give support, and not to make undue pressure. The position of the patient is of the greatest importance; its essential object is to bring the edges of the incision, and especially of that in the peritoneum, as nearly as possible in apposition, so that the space between them may be more easily filled up by the opposing peritoneum forming the anterior layer of the omentum, or by the outer covering of the intestine, if the omentum should not intervene. This is to be effected by the gentlest inclination of the body towards the wound, which may be supposed capable of keeping these parts in apposition; for although the omentum and intestines are often capable of undergoing a considerable degree of motion from side to side, independently of that peculiar worm-like movement on themselves which in the intestines is called peristaltic, they very frequently do not wander from place to place, in the manner which has been sometimes attributed to them, but remain under proper care, so far stationary, as to admit of the cut edges of the wounded peritoneum, adhering to the healthy peritoneum opposed, and are thus retained in contact with it. The serous surfaces of the peritoneum which are in contact with each other soon offer on one part and accept on the other, the process of adhesion, through the medium of lymph or fibrine deposited between them; and if this adhesion take place, it extends for some little distance from the wounded part, which it thus closes up, and cuts off from all communication with the general cavity of the belly; the previous admission of air—the bugbear of the olden time—having been of no sort of consequence. The adhesive process is the effect of inflammation, extending to a certain point, and ending in the deposition of fibrine. When it exceeds this, the secretion of a quantity of serous fluid, together with threads of flocculent matter mark the excess of inflammation, and are diffused over more or less of the peritoneum lining the wall of the belly, covering its contained viscera, and preventing that adhesion from taking place which is the safeguard of the patient.

Absolute quietude is no less to be observed. It must however be steadfastly continued; the

slightest alteration of position should be forbidden. It should on no account, and for no reason whatever be allowed, if it can by any possibility be avoided. In the position in which the patient is placed, he should be rigorously maintained, until adhesion has been effected, or all hope of it has passed away. When I first became an Examiner of the College of Surgeons, I found the practice of the older surgeons was to purge such persons vigorously, in order to remove from their bowels any peccant matters which might be in them; in the same manner that they recommended persons should be purged, who had undergone the operation for strangulated hernia—both which practices are now sufficiently condemned and reprobated, as being not only contrary to the right medical treatment of such cases, but to the physiological and surgical principles on which it ought to be founded. No purgative medicine whatever should be given to a person with a penetrating wound of the abdomen. No food should enter his mouth; and no more water even should be allowed than may be found requisite to moisten the lips, and allay any intolerable thirst which may ensue. This precaution need not be carried out so strictly, if it could be readily ascertained that an intestine was not wounded; but as this knowledge, however satisfactory it would be, cannot always be obtained, and ought not in the generality of instances to be sought for, the restriction should be fully observed, if possible. In all cases of injury of the belly, there is more or less of shock, alarm, and anxiety. It is sometimes remarkably great, even when the mischief has not been considerable. When little or no injury has been inflicted on the intestine, the natural and usual action of expelling the contents is generally delayed beyond the time at which in health, it would in all probability, have occurred. When nature shall point out, by the sensations of the patient, an inclination to perform this function, it may be assisted by an injection of warm water, or of any mild laxative which may facilitate the process, and prevent any unnecessary action of the abdominal muscles, against which the patient should be cautioned. The attendants should be forewarned that the position of the patient is not to be interfered with, under any circumstances; the necessary arrangements being made by bedsteads of a proper construction, or by other simple means, which are sufficiently well known.

The custom of directing a man to be bled forthwith, as well as purged, because he had been stabbed, was another error much in esteem with my older colleagues, but which experience did not sanction, and which I could not, therefore, approve. The abstraction of blood before reaction has taken place, after the constitution has sustained a severe shock, delays its occurrence, as well as the commencement of that inflammatory stage, which is to be so salutary in its result in favorable

cases. It tends to prevent the agglutinative process from taking place, and thus aids the diffusion of inflammation over the whole surface of the peritoneum. The general abstraction of blood is to be ordered, and regulated as to quantity by the increasing signs of reaction, and by the augmenting intensity of the symptoms of inflammation which may accompany or follow it. The quantity of blood required to be taken away in these cases is usually large, in many cases very large, particularly at an early period. It is however, often a nice point to determine when blood enough has been abstracted with advantage; and I am satisfied I have seen many cases in which too much has been taken away, as well as too little; the former being marked after death by the general diffusion of a slight degree of inflammation, without the concomitant signs of effusion of serum, and of flocculent and even almost purulent matter, indicating a severity proportioned to the symptoms and to the result. Leeches, applied in considerable number, will often be found highly beneficial, more particularly at a late period, when it is doubtful whether the sufferer will bear such a general abstraction of blood as may be necessary to give relief. The patient, after leeches have been once applied, and their good effect has been ascertained, will often himself on the recurrence of pain, or on its increase, ask for them, and I have often applied from twenty to sixty, eighty, and even a hundred, with the greatest advantage, but they are not always to be procured.

Those who have been well instructed in the treatment of disease—and what surgeon should not be so instructed?—know that the pulse is by no means a guide in the management of these cases; a small, low, and sometimes not even a hard pulse, being more strongly indicative of an overpowering state of inflammation than a quick and full pulse, and that much more depends on the pain, and the anxiety, and the general oppression, than on the apparent state of the circulation. Before general and local bleeding cease to be employed with advantage, calomel, antimony, and opium will render essential, nay, most important service.

The operations which have been performed of late years for the removal of ovarian tumors, and in which incisions of great length have been successfully made in several instances, in the linea alba, have attracted particular attention. The trifling consequences which generally follow the common operation of tapping the belly in dropsy, and which no one thinks any thing of when done in the linea alba, would seem to imply that this tendinous part may be divided with much less danger than others. That a wound in the linea alba can unite, so as to form a firm adhesion, capable of resisting a protrusion, or the formation of a hernia, cannot be doubted. Mr. Walne was so good as to send me a woman for

examination, whose abdomen he had incised to the extent of fourteen inches, for the removal of an enlarged ovary; and at the expiration of as many months, there was no sign of protrusion, the parts which had been divided seeming to be well and firmly united. In other cases, he says, a hernial protrusion has taken place, where the parts did not unite by adhesion, in consequence of the passing through of a ligature, which had been placed on the peduncle of the ovarian tumour. He also found, after death, the peritoneum completely united, without attachment to any viscus, so that it required close inspection and comparison of situation with the external wound, to ascertain exactly the part where it had been divided.

Dr. F. Bird informs me that in twelve of the cases he has recently examined, in which he opened the abdomen for the removal of ovarian tumours, the incision, in five, did not exceed three inches in length, in five, it extended to four and a half, or five inches; in one to eight inches; and in one, to rather less than twelve inches. The incisions were made in the linea alba, and without division of muscular fibre, save in one case, in which it was necessary to make an oblique incision on the left of the umbilicus, dividing transversely, or nearly so, the outer edge of the rectus, and internal portion of the obliquus externus muscles.

Remarkable contraction of the distended abdominal walls generally took place, soon after the wounds had healed, and in the majority of instances to so great an extent, that incisions of five inches became replaced by cicatrices scarcely more than an inch long. Whenever such complete contraction occurred, no tendency to hernial protrusion was subsequently observed; whilst in two patients, in whom the incisions were respectively eight and twelve inches long, the abdominal walls became but little contracted, and there resulted in one a marked protrusion of the cicatrix, and in the other a manifest hernia, for which artificial support has lately been required. In this last case the wound did not close by adhesion, but slowly healed by granulation.

In an instance in which a small incision was made transversely to the course of the muscles divided, hernia very quickly followed.

The method of closing the wound was in all cases the same, that of introducing two interrupted sutures in every inch of incision, the skin alone being included.

If it should be proved that incisions may be made with more confidence of success than hitherto has been supposed, and as these sections may lead us to believe, it will only confirm what I have constantly repeated from year to year in my lectures, that penetrating wounds of the abdomen, without injury of the viscera, when properly treated, are not so dangerous as they were generally supposed to be. In the sections made by

other surgeons for the removal of diseased ovaries, ligatures have been sometimes used for the purpose of bringing the divided muscular and tendinous parts together, and although I forbid their employment as a general rule, I do not wish to imply that in very extensive transverse wounds they can be entirely dispensed with, if only to prevent the immediate protrusions which the suture through the skin might not be equal to resist in every case.

In penetrating wounds of the belly, the offending instrument frequently passes in for a considerable distance, sometimes separating or pushing the viscera aside without injuring them, at others inflicting upon them wounds more or less severe; and in those cases of stabs from knives and sharp instruments, which are fatal, I suspect that the intestines have been injured by the point; although after the lapse of three or four days before death takes place, the small wound is not readily perceived. I have seen this in several cases, which ultimately proved fatal.

Mr. South in his annotations on Chelius, page 458, vol. 1, relates the history of a case under Mr. Green, in which two iron spikes penetrated the abdomen, the patient having fallen from a height of twenty-six feet. One, which entered just above the navel, was broken off, and was found after death in the abdomen, having deeply indented the third lumbar vertebra, and torn the right common iliac vein. It passed between the loose viscera without having injured any of them. The omentum, on the third day, or that of his death, was found adhering to the external wound.

CASE 13. W. Carpenter, private, 1st. battalion, 43rd regiment, was accidentally wounded, March 19th, A. M. 1812, by his comrade, the small end of a ramrod entering about two inches below the navel, passing in a direction upwards, penetrating the second lumbar vertebra, and protruding an inch and a half on the opposite side.

The soldier was carried from the trenches, the distance of a mile, on a bearer, the ramrod supported by one of his comrades.

On examining the wound, I found the ramrod firmly fixed in the bone. I endeavoured, at first, to extract it by a gentle turn, making extension at the same time; but in this I failed. I was then induced to use force on the opposite side, by fixing the broad end of a ramrod on the point of the protruded one, my assistant, Mr. Williams, making simultaneously the same amount of extension, that I in the first instance had attempted, but was again mortified at finding I gained nothing by the procedure. Finding myself baffled in these attempts, I conceived that I might perhaps succeed, by again fixing the broad end of the ramrod on the protruded point, in moving it by a smart stroke with a stone; in this I was not disappointed, and with the assistance of extension, completely succeeded in extracting the implement.

The man was ordered to be put on a mattress, and carried to a tent; the wounds were superficially dressed.

11 o'clock, A.M.—Patient has made water twice, but with considerable pain; is otherwise tolerably easy; venæsectio ad $\frac{3}{4}$ xx.; natron vitr. $\frac{3}{4}$ iss., one part to be taken immediately, and to be repeated in two hours if necessary.—2 o'clock, P.M. No evacuation from the medicine; an enema immediately; pain by no means severe.—4 o'clock, P.M. Has had three or four stools, and feels himself much relieved; has made water two or three times, but still accompanied with pain; urine not tinged with blood; ordered to take nothing but tea. 8 o'clock, A.M. Has suffered but very little pain; slept for about half an hour.

March 20th. Has slept several hours in the night; made water two or three times; suffers slight pain occasionally on turning himself in bed; has the perfect use of his lower extremities; pulse rather full; skin cool; repet: venæsectio ad $\frac{3}{4}$ xx.; to continue his tea, as yesterday.—7 o'clock, A.M. Has been perfectly easy; makes water with less pain.

March 21st. Has passed a good night, and feels perfectly easy and comfortable.

March 22nd. No evacuation since the 20th; pulse rather full; venæsectio ad $\frac{3}{4}$ xij. natron vitr. $\frac{3}{4}$ j.—7 o'clock, A.M. Medicine operated three or four times; feels no pain in passing water.

23rd. Has passed a good night; wounds dressed; is allowed a small proportion of bread with his tea.

24th. Going on in every respect well.

25th. Bowels regular; no pain in making water, nor did he ever pass blood per anum.

28th. So far recovered as to be able to be removed to Elvas.

(Signed) JOHN MALING, Surgeon,
1st. Battalion, 52nd Regt.

Camp, Badajoz, April 1st, 1812.

To G. J. Guthrie, Esq.

In the *Gazetta Toscana della Scienze Medico-Fisiche* for June, 1844, M. Scarutti has related the case of a woman five months advanced in pregnancy, who fell upon a stake, which entered the upper and back part of the thigh, passed upwards, and could be felt in the back, on a line with the exterior margin of the sacro-lumbalis muscle. In trying to withdraw the stake, it broke off about seven inches within the thigh, and the upper part could only be removed the next day by an incision in the loins, through the integuments, muscles, and finally the peritoneum. It was found necessary to push down the piece of wood to disengage it from the two lower ribs in order to extract it,—a knotty stick eight and

a half inches long, and between three and four in circumference. The edges of the wound were closed by suture by the operator, M. Vannoni. Reaction soon took place, requiring several bleedings. Abortion occurred six hours after the operation. The catheter was used for several days. The woman recovered in three months.

M. Bessons has related in the *Annales de la Société de Médecine d'Anvers*, the case of a lad, fourteen years of age, who fell from a bed four feet high on an iron spindle, blunt at the point, about a foot long, and as thick as a crow-quill, which was inserted into a wooden block. Pinned by the buttock, he saw the point of the spindle sticking through his trowsers by the side of the navel, whence it was withdrawn by his mother. Sent to the hospital, the lad was dismissed cured at the end of twenty days, without having undergone any particular treatment.

That a blunt instrument, like the small end of a ramrod, should be forced between the loose viscera of the abdomen without wounding any of them, may be easily conceived; but that balls or sharp pointed swords should do so, is not to be understood so easily. Ambrose Paré, our own Wiseman, Ravaton, Lamotte, Muys, and others, have related instances of this kind, in which the patients recovered in an inconceivably short space of time, but these and other recoveries of a similar nature must be considered as exceptions to a general rule.

Wounds penetrating the wall of the belly, when made by cutting or lacerating instruments, or by musket balls, are usually followed if to any extent, by a protrusion of some portion of the contents of the cavity; generally of the omentum or intestine, if not of both. This may take place at the rounded orifice of entrance of a ball, as well as at the more slit-like opening of exit, which, if the patient should recover, becomes closed by a thin tendinous-like expansion, under the cicatrix formed by the common integuments. These soon yield to the general pressure on the abdominal cavity, and admit of the formation at the part of a ventral rupture, requiring the application of a restraining bandage.

When a piece of omentum only protrudes, the direction given by the latest writers on surgery is, that it shall be returned into the cavity of the abdomen whence it came, the finger following to ascertain that it is quite free; after which the wound is to be carefully closed by sutures applied close to the peritoneum, so that the omentum may not again protrude through it. Having objected already to the manner of employing the suture, I now object to the treatment of the omentum, and do not approve of its being so dextrously returned within the peritoneum, to its natural loose situation. I desire, on the contrary, that it may be retained between the cut edges of the peritoneum, but without the slightest

* I saw this man several times during his treatment. He marched with his regiment in the summer to Valladolid, and was drowned in the Douro, whilst bathing near that city.—G.J.G.

pressure, or possible strangulation; in order that by its retention it may more readily adhere to these edges, and thus form a more certain barrier against the extension of inflammation, than is likely to take place by some accidental contact, when moving at liberty in the cavity of the abdomen, however closely it may be supposed to be applied to the inner surface of its paries.

It sometimes happens that a portion of omentum is altogether without the cavity of the abdomen, and the opening through which it is protruded seems too small to allow of its restoration to the cavity. The latest authors on this subject direct that a blunt director is to be introduced between the upper edge of the wound and the protruded part, be it omentum, or intestine, or both, upon which a blunt ended bistoury is to be passed into the cavity as far as the enlargement of the wound seems to require, after which the director and the bistoury are to be withdrawn together. I dissent entirely from this. It is scarcely ever necessary to enlarge the opening in the peritoneum, the obstacle to reduction being situated in the tendinous expansion or aponeurosis of the wall of the belly, the slightest division of which will give sufficient space for the restoration of the protruded part, in almost every instance. I have unavoidably opened into the cavity of the peritoneum in two cases in which I tied the iliac artery, in both of which I took the greatest pains to prevent this accident. I have seen it done in other instances, but no inconvenience follows these small openings not exceeding a quarter of an inch in length, when they are properly covered over by the healthy parts. I have seen disastrous consequences follow larger ones; it is, therefore, important in all cases to have as small an opening as possible in the peritoneum, and certainly no addition should be made to the size of a small opening if it can by any possibility be avoided, however indifferent a quarter of an inch, more or less, may be in the length of a large one. All protruded parts, whether omentum or intestine, should be gently cleansed with warm water, and the fingers of the surgeon should be wetted in a similar manner, the mesentery being returned first if protruded, then the intestine, and lastly the omentum or caul; the two former under all circumstances; the latter, not so, if it be adherent or inflamed, torn or jagged, or in a state of suppuration or gangrene. It should, in these cases, be left to itself, and treated in the most simple manner; a ligature should never be applied to it, neither should it be spread out and cut off, as was formerly recommended, as it will gradually retract, and be withdrawn into the cavity of the abdomen. If suppuration should take place in its substance, and the swelling of the part lead to its constriction, or the formation of matter under the integuments, or between the layers of muscular or

tendinous fibres, these may be carefully divided; but I apprehend it will rarely be necessary to cut the peritoneum in such cases, or that it has ever been done with advantage to the patient. It gives me pleasure to find that the directions thus expressed, and which have been promulgated in my lectures since the year 1816, are supported by the opinion of Baron Dupuytren in his *Leçons Orales*, and by Baron Larrey, in the third volume of his *Memoirs and Campaigns*, page 439; a concurrence of opinion which is the more gratifying to me, inasmuch as it is the result of experience gained in a similar manner, at a nearly similar point of time, the proceedings of each, which led to these conclusions, having been unknown to the other.

Several cases, on different occasions of neglected penetrating wounds during the Peninsular war, among the Portuguese and Spanish troops, as well as the English, taught me that a wound of the integuments of the belly, with the omentum protruding through and filling it up, could recover with very little comparative assistance. I have, in my work on "Inflammation, Mortification, and Gun-shot Wounds," noticed the difference between the proneness to inflammation of persons of our Northern constitutions, when compared with those of the inhabitants of more Southern climes; and that whilst our soldiers were perishing from inflammation, which could not be subdued, it was scarcely in excess among many of the Portuguese and Spaniards, suffering from similar injuries; although there are certain states of injury, from which none of any nation can recover, the period of dissolution being merely delayed. It was from the consideration of several of these cases, that I came to the conclusion that it is satisfactory to see the omentum resting between the edges of a wound in the peritoneum, and that it is the right and proper treatment not to molest, but to close the wound in the integuments over it, by the continuous suture, in the manner already recommended.

CASE 14.—Evan Thomas, aged 17, admitted into the Westminster Hospital, Sept. 1, 1828, having been stabbed with a dinner-knife immediately above the umbilicus; the wound was three-quarters of an inch long; the omentum protruded, and could not be returned, until the skin, cellular membrane and fascia were divided, the opening in the peritoneum being then distinctly seen, and against the inside of which the omentum was left, the wound in the skin being sewed up by the continuous suture. In the evening he was bled to $\frac{3}{4}$ xvi, and as he had thrown up his dinner, an enema only was administered. On the 2nd, the belly being tense and slightly painful, although he was not in constant pain, and the blood drawn before being buffy, twenty-two ounces more were taken away, an enema purgans administered, and as the bowel was not believed to be injured, four grains of calomel and six of the

compound extract of colocynth were given in two pills, with a draught of senna and salts every four hours. 3rd. The bowels open; no pain and scarcely any uneasiness on pressure; abdomen soft. No food, barley water and gruel, pulse 84. On the 6th the sutures were removed, the wound having united. He was then made an out patient, having a comfortable home.

CASE 15.—A soldier, of the 2d division of Infantry, received several stabs from a lance, in different parts of the body, at the battle of Albuhera, as the Lancers rode past him, whilst lying on the ground, one only being of any importance, which was on the right side and lower part of the belly, and through which a portion of omentum protruded. On my reducing this, the epigastric artery, which had been divided, bled freely, the pressure on it being removed; a ligature was readily applied, and the wound closed by the continuous suture. The patient, after running great risk, and undergoing a very rigorous treatment, recovered.

CASE 16.—A Spanish soldier was wounded in a scuffle in Madrid, in 1812, at the gate of the British Hospital, near the Prado, into which he was brought, with a wound in the right side of the abdomen, near and below the umbilicus, through which a portion of omentum protruded, to the size of a small orange. As this could not readily be returned, I carefully enlarged the wound, some three or four hours afterwards, at its under part by dividing the skin; and then found that it was the aponeurotic or tendinous expansion of the muscles, going to form the sheath of the rectus, which prevented the return of the omentum into the belly; on the division of this part it slipped back without difficulty, but as it did not recede further than the peritoneum, I left it there, and closed the wound, which was about an inch long, by sewing it up in the manner I have described. He was bled and starved, and was delivered up to the proper authorities with his wound nearly healed, when we evacuated the place.

CASE 17.—A Spanish soldier, standing, in all probability, sideways towards the enemy, was wounded at the battle of Toulouse, by a small musket-ball which passed in on one side, and came out at the other, carrying with it a portion of omentum, which gradually became as large as an orange, in which state I saw it four days after the accident. Little had been done; he had not suffered much pain, although the abdomen was tender; he had vomited; passed blood with his motions; was feverish and ill. I visited this man every three or four days; he suffered from privations of every kind, and each time found him better. The protruded omentum gradually diminished in size, and was at last drawn into the wound in the abdomen, and covered by granulations. He left Toulouse before me, nearly well.

Baron Larrey recommends that the protruded omentum should be left *in situ*, when not strangulated, if it cannot be readily returned, and relates some cases to prove that it will, if gently treated, be gradually drawn within the abdomen, by the efforts of nature. This I have also seen, but in others, and perhaps complicated cases, in which it has been left outside, or cut off, fatal consequences have ensued, not perhaps on this account alone; nevertheless I am indisposed to leaving any portion of it outside the abdomen, if it can be returned in a healthy state. If greatly bruised, or injured, it may be cut off, and the vessels tied if bleeding, but I do not recommend its being returned further than the edges of the peritoneum, over which the external wound is to be closed.

M. Hyppolite Larrey, the son and able successor of his father, the late Baron Larrey, has related the history of a penetrating wound of the abdomen in which the omentum protruded, in a Memoir presented to the Royal Academy of Medicine, of Paris, 1845, in which, finding he could not restore it readily to the cavity of the abdomen, he covered it with a poultice and oiled silk, treating the case otherwise antiphlogistically. Considerable inflammation followed for the first day or two; on the fourth, a suppurating surface was established. On the tenth, it began to be withdrawn, and on the thirty-sixth, it was reduced to the level of the skin. In forty-six days, the patient was cured.

Dr. Hargrave, of the City of Dublin Hospital, in 1839, in a similar case, thought it advisable to place a ligature around the protruding omentum on the fifth day; and to tighten it when it became loose. It came off three days afterwards, and the patient was discharged cured in twelve days after the accident.

A case occurred lately in King's College Hospital, in which three inches of omentum, protruding from a small wound above, and to the right of the umbilicus, in a child of four years old, were cut off, close to the abdominal parietes, by the house-surgeon; a compress of lint was applied, with sticking plaster and bandage, and the child did well in four days.—*Provincial Medical Journal*, vol. 8, 1845.

These cases shew what may be done, but not what it is generally advisable to do.

Ravaton wrote, a hundred years ago, page 607, "The views of a surgeon must be very confined, who advises the application of a ligature to the omentum, when protruding from the cavity of the belly in a healthy state. It is a cruel and deadly manœuvre, contrary to reason and experience. To restore it to its place, is so simple, just, and reasonable, that I am surprised it does not occur to every one. The reduction is easily effected. It is sometimes difficult to retain the reduced part, except by sutures. I admit that when the omentum is strangulated, gorged with blood, black, and about to become

gangrenous, the result of its restoration to the cavity may be doubted; yet experience has demonstrated that it is the safest mode of proceeding, taking care not to close the wound entirely, but to leave an opening at the lower part, to give vent to any effusion or suppuration that may take place."

When a portion of intestine is protruded without being wounded, it is to be returned, whatever may be its state, unless it be soft and unresisting between the fingers, of a dull blue or black colour, and to every surgical eye, deprived of life, or mortified. At any state previous to this (to Englishmen) almost certainly fatal condition, it should be restored into the cavity of the abdomen. When a portion of intestine is thus returned, three directions are given, by most modern surgeons, and especially by Chelius, section 517, on which his English editor, Mr. South, makes no comment, and which may, therefore, be considered to be those which are commonly taught in London, but which I entirely disapprove. The first is, that the peritoneum is to be divided, in cases in which an obstacle is interposed to the return of the intestine; this I aver to be less necessary for the intestine than for the omentum. The second is, that "after the reduction, the fore-finger must be introduced into the cavity of the belly, in order to ascertain that the intestines have not passed into the interspaces of the muscles;" A precaution which is unnecessary, and may do much mischief. The third is, that the patient is then to be placed "in such a posture as that the intestines should least press against the wound;" to which direction I object. The surgeon should certainly take care that the intestine does not pass between the layers of muscle, nor any where else, than into the cavity of the belly. So far, however, from the intestine being pushed away from the cut peritoneum, the most favourable position for it would be, to be applied against the edges of the cut membrane, and even rising up, for the least possible distance, without or above it; the great object to be desired being to facilitate adhesion, by as perfect an apposition of these parts as possible, whilst the external wound is accurately closed by the continuous suture, and duly supported by adhesive plaster compress and a bandage, provided it be methodically applied. The next best thing which can happen is, that every part being relaxed, and the patient perfectly quiescent, the intestine should press so steadily, and yet so gently against the wounded peritoneum, that it must be kept in constant apposition with, without protruding through it.

CASE 18.—A soldier of the Artillery, was stabbed in 1813, with a long knife in two places, by a townsman, late in the evening, and was carried into the hospital for the sick and wounded French prisoners, in Lisbon. The wound in the belly was situated somewhat more than an inch to the right side of the umbilicus, and was about an inch in length from above

downwards; through it a considerable protrusion of small intestine, without any omentum, had taken place. This was distended by flatus, and of a dark brown colour, when I first saw it, some time after the receipt of the injury. The bowel being constricted by the tendinous expansion of the muscular fibres, the latter was carefully divided by a blunt-pointed curved bistoury passed under its upper edge, and resting on the back of the nail of the fore-finger, by which the intestine was guarded; the flatus having been pressed out of the intestine, which was gently washed with warm water, it was restored to the cavity of the abdomen, the part last protruding being first returned, without any enlargement of the cut in the peritoneum. Of the part which had apparently first protruded, the peritoneal coat and a few fibres of the longitudinal layer of muscle were divided to the extent of half an inch, the remaining portion of the gut being unhurt. The skin was then sewed up by a fine continuous suture, and adhesive plaster, and a compress duly applied. A good deal of alarm was evinced, the pulse was very small, and the man faint. The other wound was in the back, about half an inch in extent, and near the inferior angle of the right scapula. It appeared to be a penetrating wound, but not giving rise to any peculiar symptoms, he was placed in bed on his back, with his legs raised, and the body slightly bent. Early the next morning, the officer on duty found it necessary to bleed him largely to forty ounces, according to my directions, on account of pain which had come on in his bowels, and in his back, accompanied by difficulty of breathing, the skin being hot, and the pulse quick and hard. The cellular membrane around the wound in the back was emphysematous; there was a slight cough, accompanied by an expectoration slightly tinged with blood. The bleeding removed the essential symptoms, but the pain and difficulty of breathing returning next day, it was repeated to eighteen ounces, with an equally good effect. It was necessary to repeat it on the third, fourth, and fifth days, when the pain ceased to return, and the pulse instead of being small and hard, became softer and fuller. The bowels were opened naturally on the third day, and the emphysema had gradually disappeared, no food being allowed and very little drink for some days, which was then only given in small quantities of the simplest kind. The threads were removed with scissors on the sixth day, and the man was free from complaint, although very weak, at the end of five weeks.

CASE 19.—Dr. Long, of Arthurstown, has related a case in the 15th vol. of the *Dublin Medical Press*, in which he reduced a portion of omentum, stomach, and colon, as large as a child's head, which had protruded through a large wound in the abdomen made by a knife. The external parts were brought together by five stitches of the interrupted suture, as-

sisted by adhesive plaster. The man was bled and leeches several times, and rigid abstinence was enforced. Calomel and opium were administered, and on the 16th day he was able to leave his pallet, in a miserable cabin, in which he was destitute of all material comfort.

CASE 20.—Dr. Worthington, in the *American Medical Examiner*, has related the case of a labourer, who, having been forced against a cart, received two wounds in his abdomen; one, running above Poupart's ligament on the right side, eight inches long, through which eighteen inches of colon, and thirty of small bowel, protruded. The other was a small wound below the umbilicus, on the left side, through which a small fold of intestine also protruded. The patient did not complain of pain. These parts having been restored to the cavity, the wounds were closed by sutures two inches apart, and the patient rapidly recovered, without once having been bled; an exception, certainly, to the general rule, of inflammation not following such a wound.

CASE 21.—Rosier de Landau having been called to a boy who had been gored by the horn of a bull, and a wound made from the groin to the umbilicus, through which the intestines protruded, restored them without difficulty. The next morning the boy walked three miles to see him, carrying the bowels, which had again protruded, in his shirt. He recovered in three weeks.

CASE 22.—Madame Doucet was applied to, a hundred years ago, by a soldier, who, having been struck by a halbert, had a wound made across his abdomen from above the ilium, through which a great part of his bowels protruded, and which he carried in his hat, enveloped in his shirt. Having had to walk between three and four miles, in the heat of July, to the old lady, his bowels were as dry as parchment by the time he arrived. She, therefore, bathed them in warm milk and water, until they became soft and natural in appearance; she then returned them into the cavity of the belly, and sewed up the wound with a well-waxed silken thread—thus setting an example which ought to be followed in 1847. The man recovered.

When the protruded intestine is wounded, the case is complicated, and much depends on the size of the wound. A mere puncture, or a very small cut, is often of no consequence, and does not require any treatment; the bowel should merely be returned to the cavity of the belly, and the symptoms of inflammation closely watched, and if possible, steadily subdued.

CASE 23.—A soldier, of the 29th regiment, received, on the heights of Roliça, in 1808, a stab from a sword, which made a small opening in the abdomen, yet sufficiently large to allow the protrusion of a small piece of intestine, probably from walking down very steep and rugged ground to come to me. In this there was evidently a small puncture, made by the point of the instrument. I imme-

diately returned it, sewed up the cut in the skin, and applied some sticking plaster and a compress. The man recovered, with very moderate symptoms of inflammation.

Upon the treatment of cases of this description there can be no difference of opinion, although I have seen many lost under similar management, in which no more injury had been committed. The recovery of other persons from wounds which might, on the contrary, be expected to prove mortal, renders any correct prognosis not only difficult, but almost impossible. Wounds of the cavity of the abdomen require the strictest care, an unremitting attention, and yet occasionally baffle all skill and knowledge; whilst at others they appear to set all rules, all received opinions, at defiance, of which the following may be taken as an example, from one of our oldest writers.

Littre, in the *Memoires de l'Academie Royale des Sciences*, for February 1705, relates the case of a young man, of a good constitution, who, while labouring under mental derangement, stabbed himself in the belly in eighteen different places, believing it was a lump of butter into which he was sticking his knife. Eight of these wounds penetrated into the cavity of the abdomen, and were followed by fever, tension of the belly, difficult respiration, nausea, and vomiting; he passed also, by the bowel, clots and portions of blood. He recovered in two months, having been bled seven times from the arm, in four days, each time to a considerable quantity (*quatre palettes*). In the largest wound a soft tent was daily placed, moistened with the balm of Arceus, for the purpose of allowing the escape of any extravasated matters; but, as very little was evacuated, the tent was soon changed for a simple compress. He gradually recovered, and, seventeen months afterwards, threw himself out of a window, three stories high, and died on the spot. On opening the body, the middle lobe of the liver was found adhering to the wall of the body, having a cicatrix on it, three lines long, and half a line broad. Two portions of the jejunum were adhering to each other below the stomach, on the right side; on separating the adhesion between them, the left portion of intestine showed a transverse cicatrix on it, three lines and a half long, and two-thirds of a line broad, corresponding with the direction of the scar in the skin. The opposing surface of the bowel had no mark on it, and had merely accepted the agglutinative process offered by the wounded part applied to it. On the anterior part of the colon a very oblique cicatrix was seen, five lines in length, and one and a half in width, from which eighteen or twenty filaments proceeded through the cleft in the peritoneum and the muscular wall of the belly, to the cicatrix in the skin.

It is advisable, in investigating this subject further, to consider the abdomen as devoid of cavity during life and health, the contained parts being so gently pressed upon by the containing and retaining muscular parietes around, as to enable

them to carry on all their ordinary functions, unless suffering from some derangement, exclusive of that which might arise from a deficiency of the pressure usually exercised upon them; but that this pressure can, or generally will prevent the effusion of the contents of a bowel when ruptured, if the wound be half an inch in length, or that it will prevent the extravasation of blood from an artery or vein, of moderate dimension, if torn, is contrary to facts now considered indisputable, as I have frequently had occasion to verify. That a mere puncture of the intestine does not allow the effusion of air, much less of the contents of the bowel, is not doubted. The size of the opening, which will admit of the passage of both, is however, a point in doubt; and although many surgical facts have been adduced, proving that persons have recovered from wounds of arteries and veins, and even from rupture of an intestine, the size of such opening, in whatever way it may have been made, has always been small, and the effusion, if any took place, was confined to a spot, and cut off from the general cavity of the belly. When the contents of the bowel have been more largely poured out, without an external opening, through which they might escape, inflammation and death have ensued, at no long distance of time. When blood is poured out from the great vessels, as in ruptures of the liver, or spleen—of which instances will be adduced—the general cavity may be filled; but when the injury is less extensive, or the lesion less important, the blood usually gravitates towards the back, or sinks into the pelvis. It is possible that blood may be effused in small quantity, and be then confined under the general pressure of the wall of the abdomen, and the resistance offered by its contents, to a particular spot, whence it may be absorbed after coagulation; or, by commencing decomposition, give rise to irritation, and be discharged through the external wound, if one should

have existed, or through the bowel with which it may happily have been in contact.

CASE 24.—A soldier, belonging to the 2nd division of infantry, was wounded by the Polish lancers, at the battle of Albuhera, in several places slightly, and in the abdomen severely, a penetrating wound having been made an inch long, between the umbilicus and the crest of the ilium, on the left side. Brought to me the day after at Valverde, the edges of the wound were stitched together by two sutures through the skin, and dressed simply. He said it had bled freely at first, and was then painful. Treated antiphlogistically and sharply, the inflammatory symptoms gradually subsided. The bowels were relieved by gentle aperients, there being no reason to suppose they had been wounded. A small oval swelling was soon perceived under the wound, which was tender to the touch, indicating mischief of some kind. The edges of the wound, which did not unite fully, although they were retained in contact, at last separated, and allowed about a wine-glass full of bloody matter to pass out, which reduced the swelling, and removed the uneasiness and pain of which he complained. After this he gradually recovered, and was discharged to Elvas, whence he went on to Lisbon. Whenever I have seen larger effusions of blood, the sufferers have usually been lost, from the occurrence of peritoneal inflammation. That small ones may be absorbed, I am satisfied; that they have been discharged by the bowel, I have I feel assured seen instances, as well as of recovery. I have never been so fortunate as to see a general formation of matter from effusion, and to have opened the abdomen, for the evacuation of its contents with success; although I do contemplate that such cases may occur, and surgery may come to their relief with good effect, and to this I point I shall hereafter draw particular attention.

LECTURE II.

The coats of the stomach and intestines; The third coat, or fibrous lamella; Cruveilhier's description of this coat; Mr. Quekett's account of this structure in animals; Dr. Gross' account of this coat in the African lion; Dr. Gross on its alteration in malignant diseases of the human stomach; Mr. Travers' experiments on the nature and results of injuries of the intestines; Dr. Gross on the eversion of the lining membrane of the intestines, as distinguishing traumatic injuries from ulceration of the bowels; Conclusions to be drawn from Dr. Gross' experiments; Mr. Travers' and Dr. Gross' experiments on the intestines, by enclosing them in a tight ligature, and the results; Consequences of applying a small ligature round the edges of a wound in the intestine; Manner in which wounds of intestines are closed; Sewing together, and thereby restoring the continuity of the bowel, first practised by four surgeons of Paris, by the intervention of an animal's trachea—Jemerius, Roger, and Theodoric, used a canula of elder wood for that purpose—Gilbert de Salicetti, the dry and hardened bowel of some animal; These proceedings only adopted in incomplete division of the intestine; The method of the four masters recommended by Duverger de Maubeuge; Ramdohr's operation of introducing the upper end of a divided intestine into the lower; Attempted by Moebius and Dr. Smith, but unsuccessfully; Causes of the failure; Experiments of Louis with this operation on animals; The operation a failure in the hands of Boyer, but successful in those of Laveillé, Chemery Have, Schmidt, and others; Bichat and Richerand's objections to this operation; Dr. Zina Pilcher's case of divided intestine, in which he successfully introduced the lower end of the bowel into the upper; Sir Astley Cooper and Richter's plans of proceeding; Palfin's mode of treatment of a divided intestine; Recommended by John Bell, Scarpa, Gibson, S. Cooper, Syme, and others; The practice strongly condemned by Dr. Gross, and its supporters severely censured; Le Dran and Bérard's modification of Palfin's operation; Bertrand's suture à points passés supported by Sabatier, Chopart, Desault, and Boyer; Mr. Calton's case of lacerated and penetrating wound of the abdomen, with wound of the ileum; Sir Astley Cooper, Mr. Lawrence, and Dr. Gibson's cases of a small opening in the intestines secured by ligature; Where the opening is more than two lines in extent, a simple stitch is preferable to the ligature; M. Denan's apparatus, with hollow metallic cylinders, and M. Baudens' metallic ferule,

employed in the treatment of divided intestine; M. Raybord's wooden cylinder apparatus, and the mode of employing it; M. Jobert's modifications of Ramdohr's operation; Cloquet and Jobert's cases of wounded intestines; M. Lembert's method of closing the divided intestine by suture, without the introduction of an extraneous substance within it; Mode of performing the operation; M. Baudens' case of musket-shot wound of the colon, successfully treated by the method of Lembert; Dupuytren's modification of Lembert's operation; Dr. Gely's suture en pique; Difficult of execution, and liable to objection; Mode of operating; M. Jobert on the advantages of his operation; M. Jobert on the elimination of the ligature; M. Dieffenbach's case of excision of part of the intestine, in the operation for strangulated hernia; Dr. Gross' experiments on Lembert's operation; Best mode of applying the suture in divided intestine; Mr. Travers' directions; M. Nuncianti's spiral suture; Cases; Greater danger of wounds of the small, than of the large intestines; Mr. Guthrie's method of treating wounds of the intestines; Dr. Bingham's case of excision of a considerable portion of the intestines in a lunatic, with a successful result.

Anatomy has demonstrated that the stomach and intestines, particularly the smaller ones, are composed of four distinct coats, or tunics; first, the external peritoneal, or serous covering; second, the muscular, separated into an external or longitudinal layer, and an internal or circular layer; third, the fibrous coat, or lamella of Cruveilhier, the membrana nervosa of Haller, cellulosa of others of the older writers; and fourth, the mucous, villous, or internal coat, constituting its inner lining. The third coat, or fibrous lamella, is the only one deserving of further remark, in the present state of our knowledge, its existence as a distinct tunic having been denied by some anatomists, and maintained by others. Cruveilhier says, *Anatomie Descriptive*, tome 2, page 470; in the *Library of Medicine*, edited by Dr. Tweedie, vol. 7, page 473, "The fibres of this coat have not a parallel arrangement, like those of aponeuroses, or fibrous sheaths, but form a very distinct net-work, the filaments or lamellæ of which can be separated by inflation, or infiltration. It is concerned in a very important manner, in chronic diseases of the stomach, is very liable to hypertrophy, and in certain cases, acquires a thickness of several lines."

Mr. Quekett, the assistant conservator, who has

examined this tunic, at my request, in the different preparations in the museum and stores of the Royal College of Surgeons, informs me that it is much stronger, firmer, and more elastic, in reptiles than in other animals, more distinct in carnivorous than in herbivorous animals, or in man, according to the following table:—

1 Alligator.	7 Peccary.	13 Chimpanzee.
2 Turtle.	8 Seal.	14 Monkey.
3 Leopard.	9 Dog.	15 Bear.
4 Cheetah.	10 Cat.	16 Ox.
5 Horse.	11 Man.	17 Rat.
6 Pig.	12 Porpoise.	18 Rabbit.

Dr. Gross, of Louisville, U. S., in his late most able and excellent work, entitled "*A Critical Enquiry into the Nature and Treatment of Wounds of the Intestines*," says "In the small bowel of the African lion it is an exceedingly firm, dense, and elastic texture, of a white opaque aspect, capable of great resistance, and nearly half a line in thickness."

"In malignant affections of the stomach in man, it is often remarkably altered in its structure, being rendered much thicker than in the normal state, at the same time that it assumes a dense and almost gristly hardness." It readily re-unites when divided, and is deserving our utmost attention, being the part through which the surgeon should always carry his needle, in sewing wounds of the intestines, whether or not he includes the internal or mucous lining of the bowel.

Never having made experiments on living animals, for the purpose of ascertaining the nature and results of injuries inflicted upon their intestines, I refer to those who have recorded their observations on this subject, and particularly to Mr. Travers, whose very able and philosophical work, entitled "*An Inquiry into the Process of Nature in Repairing Injuries of the Intestines*," (London, 1812) is deserving the most attentive consideration. He says, page 85, "if a gut be punctured, the elasticity of the peritoneum and the contraction of the muscular fibres open the wound, and the villous or mucous coat forms a sort of hernial protrusion, and obliterates the aperture. If an incised wound be made, the edges are drawn asunder and everted, so that the mucous coat is elevated, in the form of a fleshy lip." If the section be transverse, the lip is broad and bulbous, and acquires tumefaction and redness, from the contraction of the circular fibres behind it, which produce, relatively to the everted portion, the appearance of a cervix. If the incision is according to the length of the cylinder, the lip is narrow; and the contraction of the adjacent (superincumbent) longitudinal, resisting that of the circular fibres, gives the orifice an oval form. This eversion and contraction are produced by that series of motions which constitutes the peristaltic action of the intestines."

Dr. Gross says, page 11, that "the eversion of the lining membrane, which is so conspicuous in traumatic lesions of the alimentary tube, is never

witnessed in the openings which result from ulcerative action. There is thus a striking difference, as respects their immediate effects, between an opening of the bowel from ulceration, and one produced from an incised or lacerated wound. In the former, although it may not be two lines in diameter, extravasation would be almost certain; in the latter, it might be nearly double that size, and yet, for the reason just mentioned, that event, so much to be dreaded, would be little likely to occur."

The important conclusions to be deduced from his experiments are, first, that wounds not exceeding four lines in length (or the third part of an inch), no matter what their direction may be, are not so apt, as might be supposed, if left to themselves, to be succeeded by extravasation of the contents of the intestinal tube; and that, in the majority of cases, nature properly aided by art, is fully competent to effect reparation. Secondly, that wounds of the bowels, to the extent of six lines, whether transverse, oblique, or longitudinal, are almost always, if not invariably followed by the escape of the contents of the bowel, and the consequent development of fatal peritonitis. It may therefore be concluded from these experiments made on animals, as far as they can be relied upon with reference to man, that every wound in the bowel, of such extent as shall not admit of its being temporarily filled up by the protrusion and eversion of its internal or mucous coat, ought, if possible, to receive assistance from art, which can only be given with advantage in the first instance.

Mr. Travers tied a thin ligature firmly round the duodenum of a living dog; the ends were cut off, the parts returned, and the external wound properly closed. On the fifteenth day, the cure being completed, the dog was killed. A portion of omentum, connected with the duodenum, was lying within the wound, and the folds contiguous to the tied part of the intestine, adhered to it at several points. A slight depression was observed around the duodenum, the internal or mucous surface of which was more vascular than usual; a transverse fissure marked the seat of the ligature. "The lymph," Dr. Gross observes, page 26, "which is effused upon the external surface of a bowel, consequent upon such an operation, gives the part at first a rough, uneven appearance; but, if the animal survive several months, it is generally no easy matter to determine the seat of the injury, from the external appearance of the part. Internally, the cicatrization is almost as complete, the continuity of the mucous membrane being every where established, leaving scarcely even a seam at the original seat of contraction. The rapid manner in which the ligature cuts its way from without inwards, obviates the evils which might arise from the occlusion of the passage." In a small but full-grown dog, killed at the end of the third day after the experiment,

Dr. Gross proved that the ligature, which was round and narrow, had made its way through more than one half the circumference of the tube. In another dog, which died from the effects of the operation thirteen hours later, the ligature had entirely disappeared, and was discovered at the distance of several feet from the seat of injury. In a third experiment, in which the dog was killed upon the eleventh day, the canal of the bowel was completely restored, and the bond of connection between the divided parts was firm and organised.

Similar effects are produced when a small ligature is applied around the edges of a wound, from two to three lines in diameter, provided it be drawn with sufficient firmness, not to slip off. The process of reparation is not, however, so speedily completed, owing to the breach being much wider than when a ligature is simply placed around the tube. The mucous membrane requires a longer period for its reproduction, and the quantity of lymph deposited around and enclosing the ligature is proportionately greater.

The cases recorded by the older writers in surgery, in which opportunities were afforded of examining the parts some time after they had been injured, in consequence of the deaths of the sufferers, show that the closure of the wound in the intestine had usually taken place, when unassisted by art, through the adhesion of the cut edges to a neighbouring part, against which they had been applied. In other instances, the opening was closed by a deposition of lymph, and the gradual approximation of the edges of the wound. This however rarely takes place, unless the agglutinative fibrine is secreted in considerable quantity; which may even include within itself a foreign body, thus rendering it harmless, until some cause of irritation shall take place, giving rise to inflammation and ulceration, when the offending substance may be, luckily for the patient, carried into the bowel; the knowledge of which facts we owe to the late Dr. Thomson, of Edinburgh.

The idea of sewing together, and thereby restoring the continuity of the bowel, is attributed to four surgeons of Paris, who, having united their efforts for the relief of the sick poor in that city, in the thirteenth century, procured it is said, a portion of the trachea of an animal, one end of which they introduced into the upper part of the divided bowel, and the remaining piece into the lower, and then brought the divided ends into contact, and retained them by as many sutures as appeared to be necessary. Their writings, in which this operation is described, are lost. Peter De Argelata, who lived about the middle of the fifteenth century, says that Jemerius, Roger, and Theodoric, supported the intestine by a canula of elder wood, whilst Gilbert de Salicetti condemns both the use of the trachea and the elder-wood tube, and recommends if anything be used, that it should be the dry and hardened bowel of some animal. These ancient surgeons believed that a

transverse division of the intestine was necessarily a fatal injury, and only resorted to the methods they recommended, when the division was less complete. Duverger de Maubeuge, in the beginning of the eighteenth century, apparently unaware of what had been done before his time, brought forward this method of the four masters as an invention of his own. He cut off a portion of mortified intestine, in a case of strangulated hernia, introduced a piece of the trachea of a calf, brought the divided intestine over it, and fastened it by a suture. The trachea was passed on the twenty-first day, and the external wound was closed by the forty-fifth, the patient recovering.

Ramdohr, a German surgeon, who lived in the early part of the last century, seems to have been the first to join the ends of a divided bowel, by introducing the upper end within the lower. He removed two feet of mortified intestine in a case of strangulated hernia; performed this operation on the ends of the bowel, retained the parts by stitches, and his patient perfectly recovered. Heister, in his *Institutiones Chirurgicae*, vol. 1, page 768, says the mortified parts were in his possession. Moebius gave the first relation of this operation in his thesis, read before Heister, at Helmstadt, in 1730 (*Haller's Disputat. Anatom.* vol. 6. *Observ. Med. Miscel.* 18), but failed on repeating the experiment on a dog, being unable to introduce the upper into the lower end, in consequence of the struggles of the animal, and the inversion of the cut edges of the mucous membrane. Dr. Smith, of Philadelphia, did not succeed in a similar attempt, although he had partly filled the upper portion of intestine with a tallow candle, and divided a small portion of the mesentery, as Ramdohr directed, to facilitate its introduction. He failed, as those who have followed him have since done, in consequence of the contraction of the cylinder of the bowel, and of the eversion of the mucous surface within it.

Louis, the illustrious secretary of the Academy of Surgery in Paris, repeated the experiments of Moebius with a very successful result on animals; which he attributed to the method he pursued, in dissecting away the mesentery from the upper end of the intestine, before he introduced it to the extent of the separation, into the opposite or lower extremity of the bowel.

M. Velpeau, in the fourth volume of his *Médecine Opératoire*, Paris, 1839, says, that in addition to the case in which Ramdohr succeeded, the operation has been attempted twice by Boyer; the first patient died, and he was not able to complete the operation on the second. In a case in which Velpeau himself saw it tried in the Hôpital St. Louis, the patient died the next morning; he says, that M. Laveillé,* M. Chemery Have, Schmidt, and some others, have each succeeded in saving the life of a patient by this operation.

* Laveillé, *Journal Générale de Médecine*, tom. xv. p. 176.

Bichat, however, declared that adhesive inflammation could only take place between serous membranes, and not between a serous and mucous membrane, as in these operations. M. Richerand supported this opinion, and pronounced against the possibility of the operation being successful, according to the manner in which it had been described to have been done; and the acknowledged validity of this objection has led to the modifications which have since taken place; nevertheless Dr. Zina Pilcher, of the United States army, has detailed a successful case in the tenth volume of the *American Journal of the Medical Sciences*, 1842, in which he introduced he thinks, the lower end into the upper, instead of the upper end of the bowel into the lower, in the manner it was formerly directed to be done. N. M., a Cherokee, was stabbed on the 22nd of June, 1831, with a butcher's knife, which entering the abdomen at the left internal ring, passed upwards and inwards towards the median line, making a wound three inches in length in the skin, and another still more extensive in the peritoneum, followed immediately by a protrusion of several feet of intestines. The knife had divided the ileum diagonally, and separated two inches of the lower portion of the mesentery. The fold of intestine in contact with this, was cut on its convex side, two-thirds across; two other convolutions were transpierced, and the descending colon was partially opened, in the direction of its circular fibres. Three branches of the mesenteric artery bled pretty profusely, and were included in separate ligatures, the ends of which were cut off close to the knots. The extremities of the ileum were brought together by passing a needle, armed with a thread, through the upper portion from without inwards, thence into the lower part and out again, including half an inch of intestine in the stitch; after which it was returned through the upper end from within outwards. Three sutures of this kind made the intus-susception complete. The extremities of the ligatures were cut off near the peritoneal surface. The other openings of the small bowel were closed with the continued suture, the ends of which were left long, and so tied as to hang within the tube. The wound in the colon was united with a single stitch. The prolapsed intestines were next sponged with warm milk and water, and returned into the abdomen; a few pieces of the omentum, which had been injured by the knife, were excised, and the edges of the outer wound approximated by half a dozen turns of the continued suture. The external ligatures were detached on the 5th of July, and by the 11th of the month, the wound in the abdomen was completely healed.

Sir Astley Cooper, in trying the method of Duverger, used isinglass as recommended by Watson, with success in a dog, although the cylinder was closed by the contraction of the gut, and had been manifestly of no service, as a tube. Richter suggested, that the tube should be made of card, var-

nished, and dried. All these methods, have, however, fallen into disuse, although M. Velpeau thinks, that the proceeding of Ramdohr is deserving of further trials on animals, which being what I consider unnecessary cruelty, I cannot recommend.

Palfin, in his *Anatomie Chirurgicale*, tome 2, page 76, Paris, 1743, undervalued the operation of sewing up the intestine, having conceived the idea, that the divided ends could not unite, except through adhesion to the neighbouring parts. He thought, therefore, that he did all that art could do, by carrying a waxed ligature through the edges of the wounded parts, bringing it out through the external wound, and fixing it there by adhesive plaster and bandage; so as to keep the cut bowel in contact with the peritoneum lining the wall of the abdomen, to which it might adhere, or by being retained in, or nearly in apposition to the external wound, be in the most favourable situation for the prevention of the effusion of the contents of the bowel into the cavity of the peritoneum, and for effecting the formation of an artificial anus. Mr. John Bell strongly recommended this practice of Palfin's, in which he was supported by Scarpa, and latterly by Dr. Gibson of Philadelphia, Mr. S. Cooper, Mr. Syme, and others. Dr. Gross says, that Mr. J. Bell sinned, because he had not the requisite light to guide him; but comments with much greater, and perhaps deserved severity on the later writers alluded to, who he says, "have been instrumental in perpetuating an error for which modern surgery can find no excuse, and which deserves to be reprobated in the strongest terms, from the pernicious tendency it must exert upon the younger members of the profession, when inculcated by authorities so respectable and so very influential. Upon Scarpa, who affirmed that a wound of the intestine, whether longitudinal or transverse, should never be sewed up, and that the few who recovered when it had been done, escaped, not in consequence of the operation, but in despite of it, Dr. Gross is not less severe. He says, his case "is on a par precisely with that of John Bell. When this eminent surgeon was at such pains to criticise and condemn the practice of his namesake Benjamin Bell, he had probably little idea that the verdict of the profession would, in less than a quarter of a century, entirely reverse his decision, and treat him as unsparingly as he did his Scotch contemporary."

Le Dran, in his *Traite des Operations Chirurgicales*, Paris, 1742, thought he improved on the operation of Palfin, by introducing several loops or threads, a quarter of an inch apart, by which he drew the edges of the wound into apposition, and then twisted the ends of the ligatures or loops into one, which he attached to the external dressing. After five or six days, if the patient should live so long, the compound ligature is to be untwisted, and all the threads on one side are to be cut off, so as to allow of their being more readily drawn through, by the other. Béclard has lately suggested that the

threads should be of two colours, so that they might be drawn in opposite directions, and thus equalize the strain on the lately united parts.

Bertrandi recommended a mode of uniting the edges of the wound by a suture, which is called by the French writers who followed him, *la Suture à points passés*. It was supported by Sabatier, Chopart, Desault, and Boyer, who say it does not cause any puckering of the wound, or diminish the calibre of the bowel. The edges of the wound being placed in contact, it is sewed up, beginning about the fifth of an inch from the extremity, leaving a long end or thread; the needle should then cross *obliquely* from side to side, the threads or stitches being about two lines asunder. When the sewing up is completed, the two ends are to be brought out, and fastened at the external wound. In a few days one end is to be cut short, and the other pulled upon, to promote its withdrawal.

CASE 25. Mr. Calton, of Collingham, near Newark, has related in the *Edinburgh Medical and Surgical Journal*, vol. 12, under date of Nov. 1, 1815, one of the most interesting cases on record, in support of the interrupted suture. The child, seven years of age, was torn by the tusk of a boar in the abdomen and in the chest, opening into both cavities. The wound in the abdomen commenced an inch below the anterior inferior spinous process of the ilium of the left side, and extended six inches and a half in length, in an oblique direction, to the right side of the scrobiculus cordis, and stomach; the omentum, much of the intestines, and the mesentery protruded, the ileum being torn across, the wound extending an inch into the mesentery; the wounds in the bowel were brought together by four sutures, and the protruded parts were returned, and retained in their proper place, after having been duly cleansed from blood and dirt, by nine sutures in the abdominal parietes. This child, after many very severe symptoms, had nearly recovered, under great care and good management, from both wounds, in three months.

Sir Astley Cooper was the first to include a small opening in the intestine by a ligature passed tightly around it, in the following case:—Joseph Curtis, a butcher, twenty-one years of age, was brought into Guy's Hospital, on the 9th of December, 1808. He had a tumor in his left groin, which was very hard and tense, and gave him considerable uneasiness on pressure. Along with this was violent pain in the stomach, with vomiting of green bilious matter. Various attempts were made at reduction, but they all failed, and the operation was at once determined upon. About four inches of the small intestines were found in the sac, of a dark reddish colour, with the testicle at the lower part. The stricture, situated at the mouth of the sac, was divided in the usual manner; a fluid of a yellowish colour escaped, and on turning up the gut, an opening was discovered, which was immediately laid hold of with a pair of forceps, and tied with a ligature. The parts were then re-

turned, and the abdominal wound secured by five stitches, assisted by adhesive strips. The patient bore the operation well, and seemed much better after it. For the first ten or twelve days, however, his sufferings were severe, but he gradually surmounted them, and was discharged cured, on the 17th of January, 1809, little more than three months after his admission.

Mr. Lawrence,* following the example thus set by Sir Astley Cooper, in operating on a case of strangulated inguinal hernia, in Bartholomew's Hospital, placed a ligature in a similar manner round a small opening, which was discovered just above the part which had been compressed, and which had been probably made by the bistoury, in dividing the stricture. The ends of the ligature were cut close to the knot; a piece of omentum, which had been long protruded, and which it was found difficult to return into the abdomen, was removed by the knife; several vessels were secured in the usual manner; the integuments were brought together by sutures, and the patient was twice bled from the arm. The operation was performed on the 2nd of November, 1826. The sutures were removed from the external wound on the 6th, and came away from the omentum on the 13th, after which the patient rapidly recovered.

In another case, in which the bowel was wounded, Mr. Lawrence adopted the same mode of proceeding; death however followed within two days. The ligature was completely covered by a thin smooth layer of lymph or fibrine, and the small wound in the bowel was closed. This practice has been successfully followed by Professor Gibson, in a similar case to that of Sir Astley Cooper, and it is now pursued by most modern English surgeons, in similar cases of injury of small extent. It must, however, be borne in mind, that the ligature thus applied will be very apt to slip off, unless the opening be very small; and that where it is more than two lines in extent, a simple stitch that will bring the peritoneal surfaces in contact, will, in all probability, be safer.

In 1826, M. Denans, published in the *Recueil de la Société de Médecine de Marseilles*, No. 1, a proposal for uniting the divided ends of a bowel, by the employment of three hollow metallic cylinders—a mode of proceeding which I cannot recommend, and shall not therefore, describe, although it has received the approbation of so able a surgeon as M. Sanson, in the *Dictionnaire de Médecine, et de Chirurgie pratiques*. M. Baudens, in his *Clinique des Plaies d'armes à feu*, p. 338, published in 1836, recommends a metallic ferule, with a ring of gum elastic, which he applies in the following manner:—The elastic ring is to be introduced to the distance of three lines, or a quarter of an inch, within the upper end, the lips of which are immediately inverted, and, consequently, folded over the instrument, which is in the angle resulting from this

* Lawrence's Treatise on Ruptures, p. 301-3.—1838.

duplication; the metallic ring, which is divided in different parts by a deep slit nearly all the way round, is introduced into the lower end of the intestine to the distance of two lines, the wall of the intestine being inverted over it. The two rings thus covered by the inverted gut, are to be brought together, and maintained in apposition by a sufficient number of sutures. These operations are not likely in my opinion, to succeed on persons so prone to inflammatory action and mortification, as the inhabitants of these isles.

M. Raybord, of Paris, proposed, in a memoir published in 1837, to effect obliteration of the wound, by the introduction of a light, smooth, wooden cylinder, from fifteen to sixteen lines in length, by eight in diameter, through which a ligature, armed with two sewing needles, is to be passed. The cylinder is to be fastened inside the wound by carrying the two needles and ligatures across it, by which its edges are to be approximated; the ligature being secured by the usual knot, the ends are to be twisted and brought out at the lower part of the wound, and retained in that situation. M. Raybord himself proposes to pass the ends of the ligature through the wall of the belly, by means of a crooked needle, for greater security.

In 1822, M. Jobert, whose valuable work I have already alluded to, proposed a method, founded in some degree on that of Ramdohr, which has been employed on man successfully, in at least two instances, and frequently on animals. His first method was to pare the ragged edges of the intestine with a pair of scissors, and then to dissect off the mesentery for several lines, arresting any profuse bleeding by ligatures. Having a ligature prepared, with a moderate sized needle at each end, he introduces one needle from within outwards, in the anterior part of the upper end of the bowel, if he can discover it, and carries it out at the distance of three lines from the cut edge. The needle being brought down and held firmly, the ligature forms a loop; the same process having been repeated on the opposite side of the bowel, it is held steadily by the two loops of the ligature; the surgeon is then to invert or fold in the edge of the lower part of the intestine, like the cuff of a coat, only in the opposite direction, and in this manner place the peritoneal coat inwards. Drawing the upper end of the bowel towards the lower by the loops, he introduces his fore-finger into the inverted end of the lower bowel, and having carried the needle of the first ligature in the anterior part of the bowel along his finger, he pushes it through the inverted end of the lower bowel; and having done the same on the opposite side of the gut with the other needle, he is in a condition to be able to pull the upper bowel into the lower, and thus place the serous surface of the upper part of the bowel, in contact with the inverted serous surface of the lower, the object being to have two serous surfaces opposed to each other. The ligatures having

been securely tied, the invaginated bowel is to be retained in contact with the abdominal peritoneum, by attaching the ligatures, twisted together, to the lower edge of the external wound. M. Jobert afterwards suggested the following modification of the operation:—

“Taking care to distinguish the extremities of the divided gut from each other, he traverses the anterior wall of the upper, with a silk thread, armed with two needles. Both needles are then carried to the inferior end, and passed separately through the anterior wall from within outwards, when, by gentle traction, the operator inserts the extremities into each other, to the extent only, however, of from one line and a half to two lines, without any previous introversion of their edges. The needles are then to be given to an assistant; when taking another, which should be exceedingly fine, and armed with a very delicate thread, he plaits the serous membrane of the upper end, and afterwards that of the lower. The ligatures are to be tied with a double knot, in such a manner as to invert the inferior extremity, or turn it in upon itself, and thus bring the serous surfaces in apposition with each other. The ends of the ligatures are left hanging out at the external wound. Three sutures made in this way, are generally sufficient to preserve the relations of the parts.”

CASE 26. Professor J. Cloquet in operating on a very large strangulated congenital hernia, accidentally opened the intestine to the extent of an inch and a half. This wound he sewed up, with a common needle and thread, entering it at the distance of four lines, and bringing it out at about one line, from the cut edge, without injuring its mucous coat. Having looped, as it were, the opposite side in a similar manner in two places, he inverted the margins of the wound, and by drawing together and fastening the loops with a double knot, he brought into close apposition the serous or peritoneal surfaces of the intestine. The cut edges being by this proceeding turned into its cavity, the ligatures having been cut off close to the knots, the bowel was returned into the abdomen. This operation was performed on the 13th of July, 1826; and the patient left the hospital cured, on the 12th of the succeeding August.

M. Jobert,* in operating upon a crural hernia, in a lady, having accidentally wounded an intestine, closed the cut by two sutures, introduced in the manner already described; the bowel was then returned into the cavity of the abdomen, the ends of the ligatures being left hanging out. One was withdrawn on the 6th, the other on the 8th day. The external wound was cicatrised in a month.

M. Lembert in 1825, published in the 2nd vol. of the *Répertoire Générale d'Anatomie et de Physiologie Pathologique*, a method of closing the divided intestine by suture, without the introduction of an

* Fleury, Archives Generales de Medecine, 3rd Series, Tome 1, p. 297.

extraneous substance within it, which has been successfully tried on animals and on man. It consists of as many small strong sutures as may be necessary to close the wound, whether longitudinal or transverse, introduced at equal distances, not through the whole substance of the intestine, but through the peritoneal and muscular coats, and fibrous layer external to the mucous coat, so that when the ligatures introduced at about three lines from the cut edges, through both ends or sides of the cut intestine, are brought together, the mucous coat projects into its canal, for a line in width, and the serous coats are retained in direct and flat apposition, under the most favourable circumstances for adhesive union taking place. The knots on the ligatures being tied, the ends are to be cut off, the bowel returned into the abdomen, and the external wound closed. The sutures when successfully applied, cut their way through into the cavity of the gut by the seventh or eighth day, whilst coagulable or plastic lymph, or fibrine, is deposited on the outside of the intestine, including and covering up the ligatures; this becomes a bond of union between the injured and the adjacent textures, adhering generally to the abdominal peritoneum. The first case in which this plan was tried, was under the care of M. J. Cloquet, and is published by M. Jobert, in his work, vol. 1, p. 280; it is considered by him to have been done after his recommendation, and not after that of Lembert; a point of priority of no consequence to the public, and which they must settle between them.

M. Lembert, on the 26th of January, 1826, read to the Royal Academy of Medicine, at Paris, another memoir *sur l'Enterographie*, in which, after describing the methods employed before his time, and particularly that of M. Jobert, to which he offers objections, he proceeds to describe his improvement in the following manner:—The number of ligatures must depend on the extent of the wound, each being considered to be about one-third of an inch distant from the other, and all should be introduced before any are tightened. The forefinger being placed within the intestine, and the edge of the cut part being placed on the stretch by an assistant, the surgeon enters the point of the first needle two lines from the cut edge, and penetrates the cavity, or passes it only between the muscular and mucous coats, without entering the cavity of the bowel. Having carried it towards the edge for the distance of a line, the point is to be brought out. A loop is thus, in fact, made in the coats of the intestine, and the same thing is done in the other side of the wound, if it be longitudinal, or in the other end, if it be transverse, by introducing the needle about a line from the cut edge, and bringing it out at the distance of two lines, thus making another loop; the needle on each side thus twice penetrating the wall, or part of the thickness of the bowel. When the two ends of each ligature are drawn together, the looped parts of the intestine meet; and the cut edges, which are free, are readily

turned into the cavity of the bowel, thus admitting of the peritoneal surfaces being brought in contact; the free edges above and below, thus inverted, project out into the cavity, forming a ridge or valve. If the intestine be completely divided, a ligature should be placed in the mesentery, close to the gut. One ligature is to be left uncut from the knot, in order to attach the intestine to the wall of the abdomen, and is therefore, to be brought out at the lower end of the wound. It may be remarked, that the disposition for eversion of the mucous membrane over the serous surface, renders the completion of the suture somewhat difficult. This may be, in some degree, obviated, by steadily pushing the mucous coat into the cavity, together with the small piece of the muscular coat attached to it, by means of a blunt probe, when the ligatures are drawn tight.

CASE 27—M. Baudens in his *Clinique des Plaies d'armes à feu*, p. 336, relates the case of a volunteer, wounded by a musket-ball, in 1831, in Algeria, which entered about three inches to the left side of the umbilicus, and passed out behind in a nearly opposite direction. The introduction of the finger enabled M. Baudens to distinguish the wound in the intestine, in consequence, not only, of the opening in it, but of the hardness of the part around it, arising from the contraction of its muscular coat. Having enlarged the wound in the abdomen, he made the patient cough, when the transverse arch of the colon protruded, and presented a large hole with loss of substance, on one side. M. Baudens turned the mucous edges of the wounded intestine inwards, after the method of Lembert, and closed the wound. The patient was freely bled several times, and leeches were applied afterwards, when the patient was removed to Algiers, where the cure was effected, as readily as if the intestine had not been wounded.

As the ball passed out behind, some other parts of the intestine, must in all probability have been wounded, and they must have healed without the assistance of art.

The late Baron Dupuytren* proposed, and to which, according to MM. Paillard and Marx, M. Lembert assented, to substitute the continued for the interrupted suture, believing that it was more easily accomplished, and more certainly prevented the escape of the contents of the bowel. He directs that the suture should be begun as near as possible to the mesentery, going either through, or partly through, at the distance of a line and a half from the edge of the wound. The same thing having been done on the opposite end, the edges are to be approximated, and the same operation repeated at equal distances all round to the point where it was commenced; the stitches are then to be tightened by means of a pair of forceps, and the cut edges of the intestine, should

* *Traité theorique et pratique des blessures par armes de guerre*, rédigé par Paillard et Marx, tome 1, p. 186, Paris, 1834.

they project, should be turned in, by the aid of a probe, until they form a mere line, or seam of the peritoneal coat, the part above being in apposition with the part below. Dupuytren recommended that a loose end of the thread should be left at each end of the seam, which might be brought out and attached, one to each extremity of the wound; or they might be cut off after being tied, and a single thread applied to one of the middle stitches, for the purpose of retaining the intestine near the external wound. This mode of proceeding requires nothing more than a simple needle and thread, for both longitudinal and transverse wounds. It requires no distinction to be made between the upper and lower end of the intestine, no dissection of the mesentery, no preliminary inversion of the cut edges of the intestine, as this is effected by the drawing together and tightening of the stitches.

The suture recommended by Dr. Gely of Nantes, called the *suture en piqué*, has great analogy with that used by shoemakers, is somewhat difficult of execution, and is liable to the objection, that it causes so much inversion of the edges of the intestine, when completely divided, as to form a sort of diaphragm, obstructing the canal of the bowel, and likely to give rise to serious, if not fatal consequences; especially from the retention of the threads, which were found adhering to the intestine, in all the experiments which were made on animals. It would seem also to require a greater degree of drag upon the sound parts, in order to keep the sides of the wound in apposition, which is a great objection to it in all cases where the opening in the bowel is the result of ulceration or sloughing. Dr. Gely, describes his method in the following words:—A silk thread well waxed, furnished with a needle at each end, rather larger than the thread, is to be passed into the intestine parallel to the wound, about two lines beyond and behind one of its angles, and brought out at the same distance from the wound the other needle performs a similar manœuvre on the opposite side; they are then made to cross each other, as often as may be necessary to close the whole wound; and when the threads of each stitch are tightened by being drawn upon with a pair of forceps, the edges of the cut part are to be turned in, by which means the opening is perfectly closed. Dr. Gely gives one successful case, in which he sewed up in this manner the wound in an intestine, in December, 1841, closing the small external wound by strips of sticking plaster, and a graduated compress and bandage. The patient was bled two hours afterwards. Abundant vomiting took place during the night, but no consecutive accident occurred.

The methods of MM. Lembert and Jobert, have been followed, in France, by others exceedingly ingenious, and by some more or less complicated in their nature, of which Messieurs Amussat and A.

Thomson of Paris, Choisy, Bécclard, Moreau, Boutard, are the authors.* They do not appear to be as applicable; nor as likely to succeed, as those they were intended to supersede, and I do not therefore refer to them.

M. Jobert, in his last observations on sutures of the intestines, page 545, of the 12th vol. of the *Mémoires de l'Académie Royale de Paris*, 1846, sums up his opinion on the value of his own operation, by declaring, that it is very simple, easy of execution, and free from those accidents which attend all other methods of proceeding, for uniting the ends of a bowel which have been completely separated. He affirms, that it is not necessary to separate the mesentery from the ends of the intestine, that it is not necessary to distinguish one end from the other, and that when the cure has been effected, the calibre of the bowel is not diminished. He lays great stress, however, upon the manner in which the ligatures should come away after the operation, or be removed from the re-united intestine. It has been said, that it was formerly known, that a small ligature drawn tightly round a bowel, would cut its way through into the cavity, and pass away without destroying the continuity of the canal. The fact was, however, first explicitly declared by Dr. Thomson, the late learned professor of military surgery, in the University of Edinburgh; and Mr. Travers, in his work to which I have already alluded, rendered it more known throughout Europe. M. Jobert has availed himself of this fact, in a manner which deserves particular notice. He says, that in order to enable the ligature to pass into the cavity, it is necessary that it should have penetrated, in the first instance, entirely through its substance, constituting thereby an essential difference between his operation and that of M. Lembert; who recommends on the contrary, that the ligature should be looped, as it were, through the peritoneal, muscular, and fibrous layers of the intestine, but should not pass through its internal or mucous coat, and penetrate the cavity of the bowel. M. Jobert believes that when the ligature does not penetrate the cavity of the bowel, the part indurates, becomes liable to suppuration, and the thread is separated only to glide into the cavity of the peritoneum. When the ligatures are to penetrate into the cavity of the bowel, he admits of their being cut off close to the knot, or knots, by which they have been affixed. When they are not to penetrate into the cavity, he directs one end of the ligature to be brought out of the external opening of the wound, in order that the surgeon may gently pull upon it, and disengage the suture on the fifth or sixth day, when he thinks the union of the divided bowel has taken place. This he calls the elimination of the ligature, and considers it a very important point to be observed, in the treat-

* A review of them may be read in Vidal, *Traité de Pathologie externe*, 2nd ed., tome 4, and in Jobert, *Mémoires de l'Académie Royale de Médecine*, tome xii., Paris, 1846.

ment of such cases. He supposes it to be in a great measure proved, in the following instance.

M. Dieffenbach,* in operating on a case of strangulated hernia, cut off three inches of the bowel, and re-united the divided ends by an interrupted suture; this he passed through the outer wall of the intestine, without touching its internal, or mucous coat, which, on the end of the intestine being drawn together, was rolled inwards in the form of a ledge, or ring. The patient recovered, and remained well for several weeks, when he died of an attack, apparently of internal strangulation of the bowels. This was found on examination after death, to be in a different part from that on which the operation had been performed. On the right side of the pelvis, several folds of intestine were found adhering to the crural arch. On attempting to separate these adhesions, a small purulent dépôt was opened into, containing a loop of silk. M. Dieffenbach having laid open the intestine, found the upper extremity united to the lower by a cicatrix, interrupted in two places by two suppurating points, to which two ligatures were still adhering, and hanging into the cavity of the gut.

According to the ideas entertained in England on this subject, the safety of the patient in a case of this kind, would have depended on the deposition of such a quantity of coagulable or plastic lymph, or fibrine, as would have completely included, or encased the ligature within it, giving rise at the same time to adhesion to the neighbouring parts, and often to the peritoneum of the abdominal wall. The separation of the ligature, and its falling into the cavity of the peritoneum, would be attributed to the failure of the adhesive process by the deposition of lymph, in consequence of the inflammation having too rapidly passed beyond that stage, into the more active one, which destroyed the patient.

Dr. Gross made twenty-three experiments upon animals, with great care, in illustration of the original method of Lembert by the interrupted suture, and he sums up his report in the following words:—"The experiments terminated favourably in nineteen cases out of twenty-three, notwithstanding the wounds in some of them were of unusual extent." In three, death was produced by peritoneal inflammation, from the escape of fecal matter; in the other, the animal perished without any obvious, or assignable cause. In three of the cases, the wound was transverse; in the other, longitudinal. In the latter, experiment eleven, it was three inches and a half in length, and closed by eleven sutures; death occurred on the thirteenth day, from extravasation of fecal matter, occasioned by the imperfect union of the edges of the incision at its upper angle. All the sutures, except two, had disappeared; the wound was scarcely more than two inches long, and the reparation had been effected, mainly through the

intervention of an adjacent fold of the small intestine. The calibre of the tube was of the natural size, in nearly all the cases in which the parts were examined after death. In a considerable number of them, the consolidation of the wound was remarkably perfect, even at a very early period after the experiment, much more so, indeed, than after the use of the continued or interrupted suture.

Dr. Gross, with respect to the whole of his experiments, sums up with the following observations:—"The results are eminently favourable to its use on the continuous suture, as not one proved fatal, although the wounds in several were of extraordinary length.* In eight the needle was carried through the whole thickness of the bowel, and in five, the everted mucous membrane was pared off on a level with the surrounding surface; in eight, the suture was introduced through the fibrous lamella, or between the muscular and mucous coats; and in one, through all the layers of the tube, except the peritoneal.

It is worthy of remark, that the calibre of the tube was not sensibly diminished by the operation in any of the experiments.

Of the four methods, that of introducing the suture through the cellular fibrous lamella is the least objectionable, as it enables us to bring the serous surfaces into more accurate apposition. When the needle is conveyed through all the tunics, there must necessarily be some degree of puckering, whereby the mucous lining will be forced between the lips of the wound, if not beyond the level of the peritoneal membrane. By such an arrangement, the adhesive process would be retarded, and if the stitches were to lose their hold, or if the bowel should not become glued to the neighbouring parts, fecal effusion might occur, followed by its whole train of evil consequences.

In making the continued suture, I would, therefore, recommend, that the needle be carried through the cellular fibrous lamella, or between the muscular and mucous membranes, and not across all the tunics, as is generally advised by authors. The lips of the wound should be held parallel with each other during the operation, and the stitches, drawn with considerable firmness, should not be more than a line, or at farthest, the eight of an inch apart. The needle is to be introduced a short distance, say, half a line, from the peritoneal edge of the opening,†

* It is proper to state, that three of the animals were killed too soon after the operation, to render it at all certain, that they would have recovered from its effects.

† It should be recollected, that in wounds of the bowels there is always considerable retraction of this membrane, by which the other tunics are exposed. Hence if the needle be introduced half a line behind the peritoneal edge of the opening, as recommended in the text, it will be at least the eighth of an inch from the mucous margin, and this will afford the surgeon a sufficient amount of substance to prevent laceration, or breaking away of the stitches.

and brought out at the corresponding point at the opposite side. The first stitch should be one line from one angle of the wound, and the last about the same distance from the other, care being taken to secure each with a double knot, and to cut off the extremities of the suture close to the surface of the tube. The instrument which I prefer, and which I employed in nearly all my experiments, is a long slender sewing needle, armed with a waxed, but strong and delicate silk thread. The operation should be performed as expeditiously as is consistent with safety, and the bowel handled in the gentlest possible manner."

Mr. Travers, says, p. 188:—"Let a small round sewing needle, armed with a silk thread, be passed near to the lines formed at the bases of the reverted lips. The thread is to be carried, at short, regular distances, through the whole extent of the wound, the operator being mindful, that an equal portion of the edges is included in each stitch. When the suture is finished, let the thread be securely fastened, and cut close to the knot. The reduction of the prolapsed fold should then be conducted with the nicest caution; and when completed, the wound of the integuments should be treated with a stitch, a plaister, or a poultice, as circumstances dictate."

M. Hippolyte Nuncianti, Professor of Anatomy at Naples, has invented a mode of proceeding denominated the *spiral suture*, which he considers to possess the advantages of acting so gently on the wall of the intestine, as not to give rise to undue inflammation, and with such precision as will insure the permanent approximation of the divided extremities of the bowel. The method of M. Nuncianti seems to be neither more nor less than the common continuous suture, made with an ordinary needle and a waxed silk ligature, begun on the inside, close to one end of the incision, and brought out on the peritoneal surface about a line distant from where it entered, the end of the ligature being left hanging out instead of being fastened with a knot. The needle is then to be carried to the opposite side through the bowel, in a similar manner, from without inwards, and the sewing continued from right to left, and from left to right, until completed. The two long, or hanging ends of the ligature, are to be then gently drawn upon, so as to tighten the stitches, and to turn in the edges of the wound, the two peritoneal surfaces being thus opposed to each other, back to back. The suture should be commenced on one side of the cut bowel, and should terminate on the other, so that the two threads may be opposed to each other when drawn upon, and the inversion of the edges made more easy of accomplishment, when the ends are duly fastened and cut off. M. Nuncianti has performed this operation three times on the human subject, with success.

CASE 28.—A tailor, twenty-three years of age, being in the country, shooting, suffered from

strangulated hernia, and the bowel was injured in the rude attempts made to return it. When operated upon at the hospital, the bowel was found to have been torn for nearly the length of an inch. It was sewn up by M. Nuncianti according to his method, and the patient was discharged cured on the fortieth day, the ligature having come away internally on the seventeenth day.

CASE 29.—A young surgeon, operating for hernia on a lady thirty-six years of age, had the misfortune to make a cut in the small intestine, of nearly an inch in length. M. Nuncianti sewed it up, and the lady was cured on the forty-fifth day, the ligature coming away on the thirteenth.

CASE 30.—M. Nuncianti, operating on a man for strangulated hernia, found a slough on the anterior part of the intestine, eight or ten lines in extent, which was torn by the simple pressure of the finger; the rent was immediately sewn up, and the man was cured on the fortieth day, the ligature coming away internally on the fifteenth.

The continuous sutures of Bertrandi, of Mr. Travers, of Dupuytren, of M. Lambert, of M. Jobert, of Dr. Gross, and of M. Nuncianti, appear to resemble each other so much as to be essentially alike; the object of all being to close the bowel effectually. The later writers have attended more than their predecessors, to turning the cut edges of the intestine inwards, so as to bring the serous surfaces external to the cut edges in contact, when the ligatures are duly tightened—an important addition to the operative process. It remains to be proved, from observations and from trials made on man, whether the mode of proceeding which refrains from passing the needle and thread through the inner or mucous membrane, or that which effects this object, is the best. I am of opinion that the continued suture through all the coats of the intestine is the best; and shall continue to think so until it shall be proved that the ligature passes into the bowel in both methods; a result which is doubted, when the inner membrane remains intact.

The simplest method of making the continuous suture seems to be that which M. Nuncianti has recommended, unless it shall be found from experience, and which I apprehend will be the case, that, instead of leaving both ends of the thread long, a knot may be made on the end first inserted from within, as is done in ordinary cases; and again on the last stitch required to close the wound, which last knot may be made sufficiently firm by a turn of the thread over the needle, when the thread may be cut off close to the bowel. The stitches should not be tightened when made, but left loose until all are inserted, when they may be drawn close, one after the other, the cut edges being turned in by a probe, so that the peritoneal surfaces may be

in contact under the stitches, the divided edges being turned into the cavity of the bowel. Each stitch should be about two lines, or the sixth part of an inch asunder; and at the same distance from the edge of the wound. They must not be drawn too tightly, or they will cause the intestine to pucker, or form a ridge on the outside instead of a flat surface, the ridge or valve being within. A common needle and a waxed silk thread seem to answer very well in this operation, which should be practised frequently on the dead bodies of animals, and on man.

The first of the following cases, by Dr. Brigham, of the New York Lunatic Asylum, is very interesting, as showing what nature can sometimes do, when not interfered with by art; the other, by Mr. Jenkins, of Gosport, what she sometimes will do, when she is duly assisted by it.

CASE 31. A lady, out of her mind, made two cuts into her abdomen, with a pair of scissors, one about an inch and a half above the umbilicus, the other half an inch below. From the upper wound, she took out and cut off, seventeen inches of small intestine, weighing one ounce and one drachm, and one ounce and two drachms of omentum. One end of the intestine was withdrawn into the abdomen, and the other was returned, without hope of recovery, the wounds being closed by stitches and bandage. Injections of broth and laudanum were administered, and she was kept perfectly quiet. Thirty-three days after the accident, she had a small discharge from the bowels, and the next day a copious one; and gradually recovered.

This lady died six months afterwards, without any remarkable symptoms of disease, beyond those of general failure of health. The peritoneum, in the region of the wound, was highly congested, thickened, and adhered to the intestines. The portion of intestine removed, was the colon, not the small intestine, as supposed, four inches from the entrance of which it was divided; the separated ends were drawn together at the place of injury, and united by organized lymph, which also connected them to the walls of the abdomen. The passage between the divided ends was small, and crossed by a fine ligamentous-like band, but still large enough to permit the passage of semi-liquid feces.

CASE 32.—Richard Cain, a sailor, attempted to destroy himself, Dec, 29th, 1818, by cutting open his belly with a razor. I found him on a bed, with an oblique incised wound on the right side of the abdomen, about three inches in length, with the open extremities of two portions of intestine pouring out fecal matter, and protruding from the wound. A piece of intestine was lying upon the floor, which on examination, proved to be a part of the colon, about two inches and a half in length. The patient had lost much blood, was vomiting, and had a scarcely perceptible pulse. His extremities were cold, and he had a countenance indicating

immediate dissolution. Having administered a little brandy and water, &c., I proceeded to bring the two portions of wounded intestine together, being ably assisted by Mr. Radcliffe (now of 51, Strand), by a continued suture carried round the whole cylinder of the gut, so as to bring the edges into contact throughout the circumference. After this, I attempted to return the parts into the cavity of the abdomen, in which operation I experienced some little difficulty, from the quantity of matter to be replaced, including the omentum and mesentery; but by gentle continued pressure, the object was attained, and having with my finger ascertained that the parts were liberated from constriction, I brought the edges of the wound of the parietes of the abdomen together, by means of adhesive plaster, compress, and bandage, and left the patient with injunctions that he should take only gruel or tea.

Vespere.—Some signs of reaction have taken place, and he now complains of pain of the abdomen, with frequent vomiting and singultus, the surface being restored to nearly its natural temperature; pulse small, weak, and contracted.

Visit horâ, xi. nocte.—Increased heat of surface, with continuance of pain of abdomen, which is general, the other symptoms remaining as in the evening.—Venæsectio ad deliquium. The abdomen to be fomented frequently during the night.

30th.—Some degree of tenderness upon pressure of the abdomen, with slight tension; thinks the pain not increased; occasional vomiting, but not so frequent as yesterday; hiccough troublesome and frequent; had no motion for two days previous to the wound. From the very wretched garret in which the patient was placed, without any fire-place in it, or person to attend him carefully, I was under the necessity of having him removed to the Infirmary of the House of Industry, at Alverstoke, a distance of more than a mile from his lodging; this was effected by means of a hand-barrow, under the anxious superintendence of Mr. Radcliffe. Upon my visit at the infirmary soon after his arrival, I found the dressings loosened, the wound of the abdomen open, and a large portion of small intestine protruding from it, a part of it having been deprived of its peritoneal coat by the edge of the razor, at the time I conclude of making the first incision into the cavity of the abdomen. Having returned the intestine, I considered it prudent to insert ligatures to bring the edges of the external wound into contact, aided by compress and bandage. Was blooded and had a common enema; gruel, and arrow-root.

Vespere, horâ 7.—Pain of abdomen less; has not vomited since three, p.m.; hiccough continues, but less frequent; injection had no effect. Repet. Inject. et adde Magnes. Sulph.

31st.—Passed a restless night from continuance of pain of the abdomen, with slight tension and tenderness upon pressure; vomiting and hiccough con-

tinue; skin hot; tongue coated; pulse small and contracted. The bleeding repeated; *ol Ricini*, $\frac{3}{4}$ ss. statim, and an injection.

Jan. 1, 1819.—Pain and tenderness of the abdomen are increased with continuance of singultus; castor oil remained in his stomach, but the injection returned without effect. The bleeding and the castor oil to be repeated; the enema to be administered every four hours.

Vespere, horâ 8.—Has had three copious motions, finds himself much relieved since; belly less tender; tension decreased; pulse 98, and soft; no vomiting since the motions; complains much of want of sleep. *R. Tinet. opii. M. xxx. aq. menth. pip. 3i. misce fiat haustus, horâ somni sumendus.*

2.—Passed a better night, but without sleep; pain of abdomen very slight; tenderness and tension less; singultus continues occasionally; skin nearly natural in temperature; no evacuation since yesterday; dressed the wound, which looks well; complains most of want of sleep.

3.—Is said by the nurse to have had three hours' sleep during the early part of the night; no tension, or pain of abdomen, except upon pressure, and then but slight; is said to have vomited twice during the night; no evacuation since the 1st. The injections to be repeated every four hours, until they operate; and, in the event of their not producing evacuations, after the second, to take the castor oil draught, as before.

4.—Passed the night without pain, and continues free; had three evacuations from the injections and castor oil; tenderness upon pressure very slight; no return of vomiting; hiccough continues. Repet. inject. vespere.

5.—The only unpleasant symptom to-day is the continuance of singultus, but the patient is improved in his appearance; complains of great debility, and is anxious to be allowed food.—To be allowed weak mutton-broth for dinner, with bread sopped in it; the injection at night.

6.—Continues to mend; wound of abdomen to be dressed; union taking place, ligatures removed.

7.—Has had no hiccough for the last twenty-four hours; is improving; complains of extreme languor.—To be allowed milk, with bread boiled in it, and sago at night, in addition to mutton-broth. The enema at night.

8 and 9.—Wound dressed; it appears to be nearly healed.

12.—No material change in the patient, but upon dressing the wound, it looked unhealthy.

13.—There is some slight irritable inflammatory redness, with an unhealthy aspect about the wound of the abdomen, but without pain.

15.—This morning, a discharge took place of about nine ounces of thin pus, of an offensive character, which seems to have formed between the integument and the abdominal muscles, and not to have extended deeper.—To be allowed bread and butter, with a glass of negus at night.—The wound to be simply dressed; the injection to be repeated.

16.—Thinks himself better; wound looking more healthy; pus of a better character; is in all other respects doing well; to be allowed chicken for dinner.

17.—Much improved; offensive odour from the wound continues.

18, 19, 20.—Continues to improve.

21.—Dressing this day seems to be tinged with bile; the wound to be kept open.

23.—Debility very great; to be allowed mutton and beer for dinner.

30.—From this time, the patient gradually improved; the ulcer healed; and the patient left the hospital two months after, by running away, fearing his pension would be stopped to pay for his expenses. Upon enquiry at the pay-office, I find that he continued to receive his pension eighteen months after the date of his departure.

J. JENKINS, Gosport.

There is a much greater degree of danger attendant on wounds of the small intestines, than of the large ones: that is, recoveries more frequently follow wounds of the colon in its various parts, and of the rectum, than of the jejunum or ileum. It is not however easy to form a valid prognosis in any, even the simplest of such cases, as success depends on many causes, over which the surgeon has no control, and which he cannot foresee.

The Baron Percy relates three cases in support of this opinion, in which two musket balls passed through the colon, the patient recovering without much suffering or inconvenience. In the third, a Dutch soldier, wounded at Raucoux, by a ball, which entered on the right side, midway between the navel and the anterior superior spinous process of the ilium, passing through that bone, some oil of almonds taken the next day, came through the anterior wound, which was as usual dilated. Five days afterwards some omentum protruded with intestine, which he was careful not to return. The wound was dressed several times a day, and at the end of ten days the omentum sloughed off, the intestine was gradually withdrawn, the wound diminished, the discharge gradually ceased, and the patient recovered. An example, the Baron says, of what may be expected from nature when assisted by art. It might be said, that art did little, and that little wrongly.

LECTURE III.

Treatment of punctured wounds; When the external wound is not larger than half an inch, no attempt should be made to probe, or interfere, for the purpose of examining the intestine; When the external wound is larger, it should not be enlarged, unless the intestine protrude, or its contents be discharged through it; If symptoms of effusion from the bowel, or of extravasation of blood occur, the wound must be enlarged, and the bowel or artery secured; The wound must be re-opened, if the symptoms afterwards continue, and there be a decided swelling beneath the wound; Baron Larrey's cases; Dr. Cheston's case of removal of four inches of mortified intestine, the divided ends being brought together, and afterwards requiring to be separated, and brought out externally; General directions for the treatment of wounded intestines; Treatment of hemorrhage within the abdomen, following a penetrating wound; The wound should be enlarged, and the injured artery tied; Cases; Ravaton's cases of wounds of the vena cava and aorta; Dr. Sherman's case of wound of one of the mesenteric arteries; Penetrating wounds of the abdomen, from a musket ball; Cases; Cases of musket-ball wounds of the abdomen, with injury of the intestine; Cases in which the musket-ball was passed per anum; Case in which the ball was passed per anum, and afterwards a portion of the waist-band of the breeches; Lodging of the ball, followed by its encasement with a layer of coagulable lymph; Dr. Cox's case of wound of the intestine, the ball passing per anum.

When an incised wound in the intestines is not supposed to exceed a puncture in size, or the third of an inch in length, no interference should take place, for the nature and extent of the injury cannot always be ascertained, without the committal of a greater mischief than the injury itself. When the wound in the external part is made by an instrument not larger than one-third, or from that to half an inch in width, no attempt to probe, or to meddle with the wound, for the purpose of examining the intestine, should be permitted. When the external wound is made by a somewhat broader and longer instrument, it does not necessarily follow that the intestine should be wounded to an equal extent; and, unless it protrude, or the contents of the bowel be discharged through the wound in the first instance, the surgeon will not be warranted in enlarging the wound, to see what mischief has been done. For, although it may be argued that a wound four or more inches long, has been

proved to be oftentimes as little dangerous as a wound of one inch in length, most people would prefer having the smaller wound, unless it could be believed, from calculation, that the intestine was also injured to a considerable extent. Few surgeons even then, would like to enlarge the wound, to ascertain the fact, unless some considerable bleeding, or a discharge of fecal matter, pointed out the necessity for such operation; when there would be reason for believing, that the patient would have a better chance of recovery after the application of a suture to the wounded artery or bowel, than if it were left to nature.

If the first two or three hours have passed away, and the pain and the firm not tympanitic swelling in the belly, as well as the discharge from the wound, indicate the commencement of effusion from the bowel, or an extravasation of blood, an enlargement of the opening alone can save the life of the patient, although the operation may probably be unsuccessful. It is not, however, on that account to be always laid aside, when the state of the patient offers even a chance of success. The external wound should be enlarged, the effused matter sponged up with a soft moist sponge, and the bowel or artery secured by suture. When a penetrating wound, which may have injured the intestine, has been closed by suture, and does not do well, increasing symptoms of the inflammation of the abdominal cavity being accompanied by general tenderness of that part, and a decided swelling underneath the wound, indicating effusion beneath, and apparently confined to it, the best chance for life will be given by re-opening the wound, and even augmenting it, if necessary, to such extent as will allow a ready evacuation of the contents of the bowel. It is a point in surgery, which a surgeon should contemplate in all its bearings. The proceeding is simple, little dangerous, and under such circumstances, can do no harm. I have seen instances in which it has been done, and others in which it might have been done with some hope of its being beneficial; and I recommend it for the serious consideration of those who may hereafter have the management of such cases.

Case 24, page 16, is highly illustrative of this point, and the following cases corroborate and confirm the directions given in the strongest manner:—

Baron Larrey, in the 2nd vol. of his *Cli-*

nique Chirurgicale, p. 392, relates the case of a soldier, wounded by a sword, on the 27th of April, 1820, to the extent of a half an inch, transversely across the right inferior part of the abdomen, through which the small intestine protruded, with a wound in it, giving passage to the contents of the bowel. This M. Carré sewed up, with a needle and thread borrowed from a bystander, restored it to the cavity of the belly, and sent the man to the Hospital of the Guard in Paris. The Baron next day enlarged the wound evacuated from the cavity of the belly a quantity of blood, and then saw several (*plusieurs*) convolutions of the intestine, which had already contracted adhesions one with the other. He did not think it right to search for the wounded intestine, but contented himself with evacuating the blood effused in the species of pouch or reservoir thus formed, and dressed the wound simply. The symptoms were not diminished by this treatment; the nausea and vomiting continued, accompanied at short intervals by colicky pains, and bloody evacuations; the pulse was small and quiet; the countenance pale; eyes dull and watery, and the extremities cold. Cupping glasses were applied, and the scarificator with sharp points (*ventouses mouchetées*) was then used all over the belly, which gave great relief, and was followed by several bilious bloody evacuations. The symptoms having returned the next day, they were relieved by the same remedies, accompanied by emollient embrocations and lavements, iced drinks given by the teaspoonsful, sedatives and mild purgatives, and subsequently a blister to the abdomen. On the thirteenth day, the parotid gland on each side was attacked by critical inflammation and abscess, which appeared to remove the abdominal symptoms; and on the fifteenth, a piece of thread six inches and a half long was extracted from the wound; the man went out of hospital cured on the seventeenth day after the accident.

The Baron supposes "that the adhesions he had seen between the intestines separated spontaneously, that the sewed up intestine lost its adhesions in a similar manner, and became loose and floating in the cavity, as well as the other small intestines implicated by the wound and its consequences." He admits that the cure was greatly aided by the suture in the intestine, and by the mode of making it, and says the man was shown to the Society of Medicine, as a remarkable and fortunate case.

In a case he relates, in succession, of another soldier injured by accident, on the 6th of June, 1829, the bayonet, which entered below, and a little to the left, of the epigastrium, made a wound an inch long, and nearly two inches distant from the linea alba, and came out behind, on the opposite or right flank, just above the posterior superior spinous process of the ilium. A piece of the small intestine protruded through

the anterior opening, which his regimental surgeon closed by suture, before he sent him to the hospital, where he arrived, labouring under the usual symptoms of imminent danger.

The next morning Baron Larrey finding the belly distended with air and very painful, and the stitches of the suture quite upon the stretch, whilst a bloody fluid flowed out by the side of one of them, decided upon taking them out; after which he enlarged the wound upwards and downwards, and allowed a considerable quantity of blackish-coloured blood, which had been evidently effused into the cavity of the belly, to escape; its evacuation was aided by means of a gum elastic catheter, carefully introduced at the lowest part of the wound. The pointed cupping scarificators were frequently applied, together with a good number of leeches, and the other usual remedies, for the first nine days of difficulty and danger. On the tenth day the motions became copious, bilious, and bloody, and the dangerous symptoms disappeared until the twenty-first day, when they returned, and were overcome by the same means as had been formerly employed. He was eventually cured by the sixty-first day.

Sir Astley Cooper, in that part of his work which relates to crural and umbilical hernia, mentions a case, communicated by Dr. Cheston, of Gloucester, in which four inches of mortified intestine having been removed, the cut edges of the bowel were stitched together, and two sutures were passed through the mesentery, on each side of the divided intestine. The case proceeding badly, Mr. Naylor, the operator, thought it necessary to remove the stitches on the intestine, bringing its open edges without the edges of the wound. In the course of the night, when the patient appeared almost expiring, a sudden and violent discharge of air and feces burst forth in immense quantity, to his immediate relief; after which he gradually recovered, until the tenth day, when Mr. Naylor again brought the extremities together by suture, the operation failing in consequence of the stitches giving way. After a time, it was found that a truss almost entirely prevented the escape of the contents of the bowel. Sir A. Cooper mentions two other unsuccessful cases.

When then the wounded bowel protrudes, or the external opening is sufficiently large, or nearly so, to enable the surgeon to see or feel the injury by the introduction of his finger, there can be no difficulty as to the mode of proceeding, if the following principles are borne in mind:—

A puncture, or cut, which is filled up by the mucous coat, so as to be apparently impervious to air, does not demand a ligature.

An opening which does not appear to be so well filled up, as to prevent air and fluids from passing through it, as such wound cannot usually be less than two lines in length, should be treated by suture. The question is as to the best man-

ner of applying it. When the opening is small, a tenaculum may be pushed through both the cut edges, and a small silk ligature passed around, below the tenaculum, so as to include the opening in a circle, a mode of proceeding I have adopted, from analogy, with success, in the internal jugular vein, without impairing its continuity; or the opening may be closed by one, two, or more continuous stitches, made with a very fine needle and silk thread, cut off in both methods close to the bowel, the removal of which from the immediate vicinity of the external wound is little to be apprehended, under favourable circumstances. The threads, or sutures will be carried into the cavity of the bowel, as has been already stated, if the person survive; and the external part of the wound will either adhere to the abdominal peritoneum, or to one or other of the neighbouring parts.

When the intestine is more largely injured, in a longitudinal or transverse direction, or is completely divided as far as, or beyond the mesentery, the employment of the continuous suture is to be preferred to all others. It appears to merit the preference thus awarded to it, not only from its use in man, but from the experiments which have been made on animals, to which I have alluded in the second lecture.

When the abdomen is penetrated, and considerable bleeding takes place, and continues externally, it is necessary to look for the wounded vessel. When the hæmorrhage comes from one of the mesenteric arteries, or the epigastric, the wound is to be enlarged, until the bleeding artery is exposed, when ligatures are to be placed on its divided ends, if they both bleed. I have seen this vessel tied several times with success.

CASE 33.—A Portuguese caçador on picquet, was wounded at the second siege of Badajos, in a sally made by some French cavalry. He had three or four trifling cuts on the head and shoulders and one across the lower part of the belly, on the right side. He bled profusely, and when brought to me had lost a considerable quantity of blood, which came through a small wound made by the point of a sabre. This wound I enlarged, until the wounded but undivided artery became visible; upon this two ligatures were placed, and the external wound was sewed up. The peritoneum was opened to a small extent, but the bowel did not protrude, and the patient (not being an Englishman) recovered after being sent to Elvas.

CASE 34.—A soldier, of the same regiment, cut down at the same time, died as soon as he was brought into camp, having been severely wounded in the chest and the abdomen. He was said to have died from hæmorrhage, from a wound in the belly, two inches in length, made by one of the long-pointed swords of the French dragoons. I had the curiosity to enlarge the wound to the extent of several inches, and found one of the

small intestines had been cut half across, another part injured, and that the blood had come from an artery which had been opened by the point of the sword in going through the mesentery.

The recollection of these and of other cases has always induced me, in my lectures, to say that when hæmorrhage takes place from within the abdomen, the wound should be enlarged; and that if an artery in the mesentery, or in any other place which can be got at, should be found bleeding, a very fine silk ligature should be placed, if possible, on each of its divided extremities, and cut off close to the knot; the external wound being afterwards accurately closed.

Ravaton relates, in his two hundred and forty-third observation, the case of a soldier, wounded by a sword, which entered the abdomen, and passed between the viscera without injuring any of them, until it opened the vena cava, the bleeding from which filled the cavity, and caused his immediate death. In his two hundred and forty-fourth observation, in a similar injury in a gentleman, the aorta and vena cava were both opened, without any other internal part being discovered to be hurt.

CASE 35.—Dr. Sherman, of Rotherham, was called on the 1st April, 1841, to James Riley, who had been stabbed in the abdomen with a large pocket knife. The wound, six inches in length, of a crescentic form, across the lower part of the left side of the belly, allowed a large quantity of intestine to protrude, enough it was supposed to fill a wash-hand basin. One of the mesenteric arteries had been wounded, and bled profusely; the man was exhausted. The parts having been gently cleansed, the artery was tied, and the bowels returned. Several stitches were introduced through the muscles, and close together, to bring the divided parts in apposition, with the aid of adhesive plaster and bandage. He was kept quiet in bed, with the abdominal muscles relaxed; his bowels were moved by injections, and he was bled when reaction took place. He perfectly recovered in about six weeks.

When a musket-ball penetrates the cavity of the belly, it may pass across in any direction, without injuring the intestines or solid viscera. It usually does injure one or the other, and it has been known to lodge without doing much mischief. The symptoms are usually indicated by the parts injured, although in all the general depression and anxiety are remarkable, and their continuance sometimes marks the extent of mischief.

The following cases of the survivors of hundreds who died under similar wounds, during the war beginning with the battle of Roliça, in Portugal, in August, in 1808, and ending with that of Waterloo, in June, 1815, may be read with a melancholy interest, as shewing what sometimes will happen in a few rare instances; and, even then, as more dependent on the wantonness of

nature, than on the united efforts of science and of art.

CASE 36.—A soldier of the brigade of heavy cavalry, under General Le Marchant, advancing in line to charge the French infantry, at Salamanca—on which occasion the General was killed—was struck by a musket-ball, which entered in front, between the umbilicus and ilium of the left side, and came out behind on the opposite side, above the right haunch-bone, thus traversing the body. The bowel protruded in front, but was uninjured, and was easily restored to its place. He remained at the field hospital with me for the first three days, and was rigorously treated, as well as afterwards in the San Domingo Hospital, where he gradually recovered, and was ultimately sent to the rear.

CASE 37.—Dr. Hennen has related, in his work, the case of a soldier of the Brunswick corps, who was wounded at Quatre-bras, on the 16th of June, by a grape-shot, which destroyed the elbow-joint, rendering amputation necessary, and passed across the anterior part of the abdomen, without injuring the bowels, a portion of which protruded at each opening. The patient was brought to the hospital at Brussels, on the 19th, with moderate fever, and very little pain in the abdomen, the functions of the intestinal canal not being disturbed. He did not take any medicine, and lived on light broths. The wound healed slowly, and cicatrized in the course of three months, leaving only some uneasiness behind during a change of weather, or when any irregularity of diet was committed.

This case interested me greatly during the time I spent at Brussels after the battle of Waterloo; principally from the absence of all peritoneal inflammation, that was not actually necessary for his cure, and from the freedom with which the functions of the bowels were performed, indicative of their substance not having participated in the injury.

CASE 38.—A soldier, of the fusilier brigade, was wounded on the heights of Saca Parté, in 1811, in front of Sabugal, by a small musket ball, which entered a little below the umbilicus, and to the side of the linea alba, and made its exit at a corresponding spot behind, near the spine. The wound was dressed simply, and the man was carried the next day to Sabugal, where he was bled, and almost starved. The symptoms which ensued were of little comparative moment. The bowels were gently opened by castor oil; no blood was known to pass, and he gradually recovered; although he was sent to the rear, and did not rejoin his regiment.

In this case, and in others of a similar nature, it does not follow that the bowels were not injured. The part injured, even if its life were destroyed, may be attached by the adhesive inflammation surrounding it, to the adjacent ones which are sound; and the slough when de-

tached, drops into the cavity of the bowel. The only difficulty is, in comprehending why it happens that so little inflammation is excited in some cases of most serious injury, and so much in others, apparently of little moment.

CASE 39. Lieut. Slayer^s, Smith, of the 13th Dragoons, being engaged at Campo Mayor, on the 25th March, 1811, with a much superior force of French cavalry, was shot by a pistol ball, in the rear, by a Hussar of the 16th regiment, whilst engaged with one of the 26th Dragoons. It entered at the left hip, three inches and a half from the junction of the ilium with the sacrum, and an inch and a half below its crest, and came out about three inches below the navel, and one inch to its right side. He felt a terrible shock, but did not faint or fall from his horse; on being relieved from his two antagonists, he dismounted, and became aware of the injury he had sustained, which he thus describes:—

“There was a protrusion of bowel from the wound in front, of about three inches; but little blood issued from it. The hemorrhage from the wound in my back was very copious. I was obliged instantly to remount, as a French squadron followed up our rear, and a French officer, with three or four of his men, were so near me, that he called out ‘Rendez vous, mon officier;’ to which I replied ‘Pas encore, Monsieur,’ and got away. I had not time to do more than pull up my overalls, therefore they remained open, my shirt flying about; so that I was compelled to hold the protrusion, and keep it in as much as I could with one hand; but it had now lengthened to six inches, and I felt so disgusted with having it in my naked hand, that I wrapped it up in my shirt.

“I reached the field hospital shortly afterwards, when the protrusion was returned without enlarging the orifice, and no stitch was put into the wound, then or afterwards. It was dressed merely with lint and adhesive plaster.

“I was carried on a bearer to Campo Mayor, where Marshal Beresford kindly took me into his quarters, and where I begged earnestly for a glass of Madeira, which, after a little hesitation on the part of the surgeon, was given to me. But they afterwards thought it necessary to bleed me; but little blood followed the insertion of the lancet. This was the *only* time I was bled.

“Soon after, I felt as if I were dying. My breathing became short and oppressive, and a strange sensation came over me, which was relieved by a most violent sickness. I slept pretty comfortably and quietly that night. In the morning, I found the bed saturated with blood, which had trickled through to the floor, and had escaped from the wound behind.

“My diet was for some time very sparing, consisting of tea, dry toast, and light pudding. Previously to being wounded, I had eaten little or

nothing for twenty-four hours, which probably saved my life. I had no motion for two days, and a glyster was administered, which had the desired effect in a partial degree; and as no blood came away, or followed, the surgeons were satisfied that my bowels were also safe.

"Before a month had elapsed, I and all the wounded were removed to Elvas, in *bullock-cars*, and a desperate journey it was.

"On my arrival, inflammation began in the wound in front, accompanied with great swelling and pain. The swelling was laid open, and a quantity of matter was evacuated, followed by an angry-looking protrusion, which was carefully washed with warm water, and poulticed; and, when the inflammation had subsided, was dressed as before, with lint, confined by adhesive plaster. When the protrusion was touched by the hand, I again experienced that nauseous and disgusting sensation I have already alluded to, and to which, in comparison, the application of the knife or lancet was a flea-bite.

"The protrusion gradually receded, the inflammation abated, and the skin healed, till which time my diet was very low indeed; but after which I was gradually allowed to take meat, and wine *thoroughly* diluted with water.

"At the end of May, I travelled in a hired carriage, by slow journeys, to Lisbon, and embarked in the *Audacious*, 74, for England; wearing, by the advice of the surgeons, a broad belt as a support, which has since been superseded by an elastic belt and a defence, which have been most efficacious, and were approved of by you. I arrived in England in June, and in September was recommended to try Brighton for change of air, where I placed myself under the care of Sir Matthew Tierney. Soon after, I felt terrible pains in the *right* side of my back, in a line with the wound, through the ilium, or rather above it, where a kind of tumour or excrescence formed, and which worked and moved like a mole under ground. Sir Matthew pronounced it to be something carried in by the ball, but postponed opening it till it attained a more favorable situation. For several days I suffered agony from it, and one night on retiring to bed the pain was so great, that I perspired amazingly, which in some measure I thought relieved me. Completely worn out, I fell into a long and deep sleep, and awaking late in the morning I found all pain and excrescence gone, and nothing remaining but a tenderness of the parts on pressure of the finger. I underwent much from violent spasms in the stomach, which I never had before I was wounded. I recovered, however, sufficiently to rejoin my regiment the following spring, in the Peninsula, and was soon afterwards again wounded in a skirmish, by a spent shot, in the left shoulder, which, however, was of no moment; though I was compelled to return to England on sick leave, in October, 1812, as the

spasms increased with greater severity, incapacitating me from doing my duty, and at times rendering me totally helpless.

"I may as well mention here that I had a sabre cut on my head, in the day of Campo Mayor, before I was shot through the body; but it was so slight a wound, in comparison to the other, that little or no notice was taken of it by myself, or any one else.

"I now gradually recovered my health; and, in the spring of 1815, accompanied the 10th Hussars to Belgium, and served at Waterloo, and during that campaign, with the exception of being in the possession of the French for a few minutes, in the cavalry affair of the 17th of June, under Lord Anglesey, escaped unscathed.

"My health gave way in 1821, and I certainly was in a precarious state for three or four years; but I gradually recovered, and by dint of great care and attention to diet, I am now in robust health, and can take with impunity the strongest exercise.—Dec. 14, 1846."

CASE 40. John Richardson, of the 1st Royal Dragoons, was wounded at the battle of Waterloo, by a musket-ball, which entered two and a half inches above the umbilicus, and passed out on the left side, close to the lumbar vertebrae. He threw up a considerable quantity of blood, and the stomach was so irritable that nothing would remain on it. He complained of pain (which cut him right across, as he termed it); his eyes were suffused, and face flushed. Had head-ache; the pulse was 130. Thirty ounces of blood were taken from the arm, emollient injections were thrown up the rectum, and poultices applied to the wounds.

June 20.—Some blood came away with the injections during the night; there is great tension of the abdomen. Complaints of great pain in the right side and shoulder. Saline draughts will not remain on his stomach, and are returned, tinged with bile and blood. Pulse 130; bled to 16 ounces; injections and poultices continued.

21.—A draught remained two hours on the stomach; when thrown up, it was mixed with blood, and a large quantity of bilious fluid. He was attacked with diarrhoea during the night, and the feces were mixed with blood. Pulse 120, and full; skin hot, and tongue furred in the centre; venæsectio ad $\frac{3}{4}$ xij. The blood taken from the arm is sisy. A little coffee, which he asked for, remains on his stomach.

22. Slept a little during the night; had several alvine evacuations, mixed with bilious fluid and blood. The tension of the belly is not so great; skin cool; tongue clean, but dry. He still complains of pain (in his inside, as he terms it); pulse 110, but very full. Tea remains on his stomach, but says he feels as if something very heavy was pressing on it; his face is still flushed. Venæsectio ad $\frac{3}{4}$ xij.; fomentations and poultices

to the belly; chicken and beef broths; injections frequently.

23.—Slept a little during the night; feels much better; had several evacuations, mixed with bile only; skin cool; and tongue not so dry. He still complains of weight at the stomach. Beef tea is retained; face not so flushed; pulse 110, but soft.

24. Had several alvine evacuations since yesterday; feels considerable relief, from the tension of the abdomen having subsided; threw up his tea and a quantity of clotted blood this morning, which appears to have removed the sense of weight he complained of; pulse 104, and soft.

25. Slept four hours during the night. Beef-tea, &c., remains on the stomach; pulse 104. He still complains of pain in the direction of the wound. Fomentations, poultices, and injections continued.

26. Had a bad night; pulse 125, and full. Complains of great pain in the hepatic region and stomach, and backwards, towards the spine; tongue dry, and skin hot. *Venæsectio ad 3 xvj. R. Hydr. submuriat. gr. iv. conf. rosæ gr. ix. ft. Pil. ij. capt. j, bis die.*

27.—The pills operated; perspired in the night; skin soft; pulse 112. *Repetantur pilulæ ex. Hydr. submuriat.*

28.—Is much better in every respect. Broths, &c. remain on the stomach; skin cool; bowels open; only two of his stools were tinged with blood; pulse 109.

29.—Feels a sense of weight at the stomach this morning, and has nausea. Complains of much pain in the direction of the wound. Medicaments as before; discharge from the wounds of good consistence; pulse 114.

30.—Vomited in the night, mixed with blood; tea, &c., remains on the stomach this morning; pulse 108.

July 1.—Is in all respects better; the pain in the direction of the wound is relieved; broths, &c., remain on the stomach; pulse 100.

5.—The *adnatæ* have a yellow tinge; in other respects, is doing well. *R. Hydr. submuriat; gr. x: extract. colocynth; 3i. ft. pil. x. capt. i, ter in die.*

8.—Is free from pain, the wounds discharging healthy pus; appetite and pulse good.

12.—Was able to sit up in bed yesterday for several hours; complains of being deprived of food.

20.—The wound perfectly healed; is cleaning his accoutrements, boots, &c. Was discharged on the 28th July, perfectly recovered.

JOHN A. CAMPBELL, Surgeon to the Forces.

In charge of Elizabeth Hospital, Brussels.

CASE 41.—Owen Mc. Caffrey, aged 33, 1st battalion 95th regiment, was wounded on the 18th of June, at the battle of Waterloo, by a musket-ball, which penetrated the cavity of the abdomen, on the right side, about midway between the superior anterior spinous process of the ilium, and

the linea alba; when admitted into the Minimes General Hospital, three days after, he was in the most deplorable state; the whole abdomen was tense, and exquisitely tender; the pulse small and wiry; vomiting incessant, with hiccough, and ghastly visage; from this period to the 24th, he was thrice largely blooded, and the strictest antiphlogistic plan was laid down, and rigidly adhered to. Laxative injections were administered, the whole of the abdomen was frequently fomented, and opiates were administered to allay the irritability of the stomach, and to procure ease and rest. On the 25th, the wounded intestine sloughed, and the *fœces* escaped by the external orifice, the adherence of the two surfaces of the peritonæum preventing any, even the smallest portion, getting into the cavity of the abdomen.

26th. The high inflammatory action having been reduced, milk, rice, and sugar, and the farinaceous part of the potatoe, were allowed.

27th. The debility being very considerable, eggs and wine were added to his former diet.

July 1st, No very alarming symptom remains; half a fowl ordered for his dinner, and the greatest attention to personal cleanliness directed to be paid.

7th. Strength slowly but gradually returning. The action of the large intestines is daily kept up by stimulating injections. The fecal discharge from the wound diminishes. Draughts, with infusion of columba and tincture of rhubarb, are given twice a day.

14th. Progress to recovery satisfactory. The injections are daily repeated, and the discharge by the natural passage increases. The wound contracts and looks healthy. Is enabled to sit up, and has recovered his cheerfulness.

24th. Goes on remarkably well. The same plan is pursued, courting the action of the large intestines by thin stimulating injections, daily repeated; giving tone to the digestive organs by the bitter draughts, and increasing the general strength by generous and nutritive diet.

28th. Still improving, and promising ultimate recovery. Embarked, in the best spirits, for England.

J. COLE, Surgeon to the Forces.

Antwerp, August 27th, 1815.

P.S. I should have observed that the situation of the ball was never ascertained.

General Hospital, Yarmouth, Sept. 16th, 1815.

Owen McCaffrey was admitted on the 10th of August from Antwerp; health a little impaired; countenance pallid; tongue white; without thirst; appetite good; wound looking healthy. Until the 1st of September, feculent matter was discharged from the wound, which was dressed with a simple compress; it then ceased. He takes a mild aperient every other day, and is now nearly well.

ROBERT MOIR, Hospital Assistant.

To G. J. Guthrie, Esq.

CASE 42.—A serjeant of infantry was wounded at the storming of San Sebastian, by a musket-ball, in the right hypogastric region, which entered an inch from the anterior superior spinous process of the ilium, passed across the cavity of the abdomen, and came out close to the sacrum on the same side. The fæces were discharged through the anterior wound for a long time, particularly after meals. The symptoms were not at first severe, although he was bled four different times. In August, 1814, he arrived at Plymouth Hospital, lame, from a shortening of the limb of the side wounded; it was drawn forwards on the trunk, probably from the psoas muscle having been injured. Fæcal matter was no longer discharged from the anterior wound, which was open, and giving out a little watery matter, with some flatus. The posterior wound healed readily, never having discharged any fæces. He suffered frequently from constipation and colic, and was obliged to take aperient medicines on such occasions. He was strong and well in health, although his countenance, of a dusky colour, indicated perhaps some sort of visceral derangement, when he was discharged.

CASE 43.—Colonel Ouseley was wounded, in the south of France, at Arbas, on the 3rd August, 1813, by a musket-ball, which entered three inches below the umbilicus, and a little to the left side, and passed out close to the posterior spinous process of the ilium behind. He passed fæces through the wounds, and blood per anum, for six or seven days, when the severity of the symptoms subsided under a vigorous treatment. Matter formed between the muscles, and had to be evacuated by incisions. Sensation and motion were lost on the outer part of both legs; the right has recovered, but motion is impaired in the left, and sensation is deficient on the outside of the thigh, of the calf of the leg and buttock, now, fifteen years after the receipt of the injury when this note was written.

The following case, from Baron Larrey, was very successful:—

CASE 44.—M. N. was struck at Cairo, in 1799, by a musket ball, which cut through the wall of the abdomen, and wounded the ilium. Both ends of the bowel protruded, were swelled, and turned back on themselves, so as to form a stricture on the gut, preventing the passage of anything from above. The Baron divided the contracted end of the intestine with the scissors in four places, so as to remove the strangulation; and having passed a suture through the mesentery close to the divided intestine, he returned it to the cavity of the belly, fastening the ligature to the external parts. The symptoms which followed were severe for some days, but gradually subsided; the contents of the bowel passed through the wound, and two months afterwards the ends of the intestine were seen to be in contact with each other. The parts were then

dressed after the manner, and from time to time during two months, with the tampon or plug of Desault; at the end of which time the patient recovered.

I have seen several similar cases in British soldiers, but they nearly all died of their injuries during the inflammatory stage. In this case, although successful, there can now be little doubt that the more proper course to be pursued would have been the employment of the continued suture. As the external wound could not unite or meet closely, the retention of the intestine by a thread near the opening could do little harm if it did no good, and no real assistance was given by art to nature.

CASE 45.—In a soldier, of la jeune garde imperiale, under the care of staff-surgeon Dumoulin the ball entered to the right and a little below the umbilicus, and passed out on the left or opposite side, about two inches above the crest of the ilium. It was supposed to have entered, and to have passed along the canal of the great arch of the colon. Fæcal matter, much tinged with bile, passed by both openings. The symptoms of inflammation were severe for the first few days, but gradually yielded to the means employed, when the bowels began to act regularly by the aid of mild injections, and the discharge from the wounds gradually lessened; the man was much reduced, but otherwise in good health, and was sent to France from Brussels nearly well.

CASE 46.—A soldier, of the 3d division, whilst moving forward immediately under the orders of General Sir James Kempt, after the first charge of heavy cavalry at Waterloo, was struck by a musket ball on the right iliac region, a little within the anterior superior process of the ilium; it passed across and came out a little below the umbilicus on the opposite side. A fæcal bilious discharge, evidently from the small intestine, took place from the first day from both orifices; the symptoms were at first severe, but were subdued by vigorous treatment; the wounds gradually closed in, and the man was sent to England to be discharged, well although weak.

It may be questioned whether these patients would have done as well, if the external openings had been enlarged in the first instance, to allow of sutures being applied to the wounds in the intestines. It must, however, be recollected that these were cases of recovery, and that numbers of others, perhaps similarly as well as more seriously wounded, had died. It will be for those who follow us to decide a point so important, and to which their best attention will now be drawn, in a manner which, I trust, cannot fail to be of service. The late Dr. Thomson, in summing up his remarks on what he saw on this subject, after the battle of Waterloo, says, p. 106, "The more that is left to nature in the progress of reunion, and the less her operations are interfered with, the

greater will be the chance of ultimate recovery." The remark is correct, provided it be applied to those cases, in which no clear indications for interference are present. When they are present, the do-nothing system is generally followed by death. A well regulated interference is likely to be more successful.

CASE 47.—On the advance of the British army, in 1809, from Coimbra to Oporto, the French rear guard halted in front of a wood near Grijon, and a sharp affair took place for their dislodgment. The first man wounded was shot in the abdomen. The ball entered about an inch below the umbilicus and lodged, giving him great pain. I saw him within five minutes. He said he was killed, and looked like death. He rallied but little, and continued to suffer pain until the next day, when he died, in spite of all the means adopted for his relief.

CASE 48.—A soldier of the French Imperial Guard, was wounded at Waterloo, and brought to the hospital at Brussels under Acting Staff-Surgeon Lyons, with two openings made by the entrance and exit of a ball in the fore part of the abdomen, below the umbilicus. He stated, that the bowel protruded at both openings, but being unhurt, was returned into the cavity, and the wound dressed with lint and adhesive plaster. The symptoms were severe, and continued with remissions until the sixth day, when the bowel gave way at a part where it had been apparently bruised by the ball; its contents were discharged by the wound of exit, for two or three days, when the patient sank and died.

CASE 49.—La Motte says in his 241st observation, that called to a young man wounded in the upper and lateral part of the epigastric region, he dressed the wound simply, and bled him once. On the fifth day symptoms of inflammation made their appearance, and on the eighth he died, in spite of the means employed. On opening the body he found the ileum wounded in three places, but the wounds was so small that he could only just discover them, and no effusion had taken place through them.

These cases may be compared with the preceding ones, in which the wounds being externally somewhat similar, the patients recovered, although the same treatment was carried out in all, and they may be also compared with the succeeding ones which are not less remarkable.

CASE 50.—A soldier, of the third division of infantry, was wounded during the assault of Ciudad Rodrigo, by a ball which entered and lodged in the left side of the back, about midway between the spine and a line drawn to the upper part of the crest of the ilium, and from which opening the contents of the bowel were discharged. Left among the dead, and those who were supposed to be dying, at the field hospital, in the rear of the trenches, I sent him, with all those of different corps who were not

dead, including Lieut.-Colonel Grey, of the 5th regiment, and Captain Flack, of the 88th regiment, whose case I have elsewhere related, to my own hospital, that of the 4th division, at Aldea Gallega, some ten miles off. Here, under a sufficiently vigorous treatment, of which bleeding, starvation, and quietude were the prominent features, he gradually recovered. On the fifth day the ball passed per anum, and on two or three different occasions afterwards, portions of his coat, flannel-shirt, and breeches. Fæcal matter passed readily through the wound, whilst the bowels were gently solicited by common injections for some time; but the wound gradually closed in, and the man regained his health, and was sent to the rear, with a slight coloured discharge from the wound, not quite free from odour.

CASE 51.—Ensign Wright, 61st Regiment, was wounded by gunshot, on the morning of the 10th of April, at Toulouse. The ball passed through the abdominal parietes, on the right of the linea alba, and nearly half way betwixt the umbilicus and the pubes. Sense of debility, tremor, nausea, small feeble pulse, and pain in the lower part of the abdomen, were the immediate symptoms.

No tympanitic tension, increased pain, or vomiting, had occurred by 10 P.M.; several stools occurred in the course of the night, of a thin consistence, without admixture of blood.

Peritonitic and enteritic symptoms, of considerable violence, having begun to manifest themselves on the 11th, copious and repeated evacuations of blood were made, by order of Mr. Guthrie, the Deputy Inspector-General in charge of all the wounded. Fomentations were applied to the belly; abstinence in food and drink was strictly enjoined; and the most rigid antiphlogistic regimen followed. The same practice was pursued during the 12th, 13th, and 14th; venesection being performed either two or three times every day, as the augmented state of the local and general inflammatory symptoms seemed to require. The bowels, during the above period, had continued perfectly free, and the dejections were tolerably natural in colour, but rather dark, and extremely fetid. He had been frequently troubled with nausea, and vomiting of bilious matter. Two small doses of castor oil had been exhibited.

Toast and water, tea, boiled milk and water, with a little soft bread soaked in it, and mutton and chicken broth, in small quantities at a time, were all that was allowed him for food and drink. His chamber was kept cool, and of equable temperature, and he observed silence and tranquillity.

April 15.—Pulse above 100, weak and small; temperature natural; the tongue clean. Continued affected with a degree of nausea and vomiting, after drinks especially; and some

diarrhœa was present. The abdomen was not painful, even on pressure, except in the vicinity of the wound. In the evening he was much griped in the lower part of the belly; some degree of thirst was present; his pulse rose to 120; small, and not soft. Fomentations were frequently applied to the abdomen, and blood let to syncope.

16.—He rested well; free from pain of abdomen, except near the wound; several stools, natural in colour; thirst not so urgent; temperature natural; pulse 100, weak.

17.—Was bled last night to twelve ounces, in consequence of increased pain of abdomen and augmented pyrexia; to-day, quiet and easy, and has had several stools.

18. Diarrhœa and tenesmus troublesome during the night; *ball* voided with the feces at six A.M.; it is somewhat flattened, as if from impinging on a stone; has felt easy since. Continue antiphlogistic regimen.

19.—Diarrhœa abated; but abdomen is tense and painful on pressure. He is distressed with nausea and vomiting; pulse 100, and sharp; great thirst; tongue dry. Venæsectio ad $\frac{3}{4}$ xvj. Abdomen fomented.

20.—Venesection was repeated last night, from persistence of the symptoms of peritonitis. Blood drawn very buffy; has had several loose stools during the night. He is to-day easy; abdomen now scarcely painful. Fomentations continued.

29.—From the 20th to the 29th, he remained easy; the external wound had closed; he had continued free from pyrexia, and his evacuations had been regular.

In the morning his abdomen was tense and painful, on pressure; he was affected with nausea; and he had vomiting repeatedly during the night; thirst and pyrexia attended. Fomentations applied from time to time, and yielded relief. Suspect that he has not observed the regimen prescribed him.

May 1. Pain of abdomen, and bilious vomitings during the night. Dejectiones iij. liquidæ. Pulse 110; hard and small; thirst urgent. Blood let ad deliquium; fomentations continued.

2.—Last night was again bled to eight ounces, when deliquium supervened. He passed a quiet night; had two liquid stools; his abdomen is not painful; nor is he sick at stomach, or thirsty. To keep himself warm, particularly the belly.

3.—Passed the night quietly, and says he is easy; pulse 96; skin moist and cool. Nil.

4 to 10.—These days were passed quietly; and without any material deviation from the healthy state occurring.

11.—Suspect he has been rather irregular in diet. Passed a bad night, partly in delirium; has vomited much: he has obviously pain on pressure of the abdomen, but he appears studious to conceal it; pulse 112, small, and not soft; temperature increased; tongue red; thirsty; dejectiones iij.

liquidæ; foveatur abdomen; capt. tinct. digitalis gutt. x. ter in die in mucilag. g. arab. $\frac{3}{4}$ ss.; diætæ ex lacte et farrinaceis; pro potu, inf. theæ. parvulis haustulis.—Horâ 8. Pulse 120, soft; feels easier, and has not vomited; adhibeatur pediluvium.

12.—Pulse 120, soft; says his abdomen is not painful; seems yet averse to its being pressed; says he has not vomited, and that he is not affected with nausea.—Dejectiones iij.; cont. digitalis; vespere, adhibeatur pediluvium.

13.—Molested by pains, nausea, and vomiting during the night; pulse 110, not soft; skin cool, but is thirsty, and his tongue is of a vermilion colour, and arid; confesses that he has hitherto disguised his feelings, as well as other circumstances connected with his case, particularly his manner of living.—Cont. digitalis; applicetur vesicatorium regione epigastricâ; vespere utr. pediluvium.

14.—Bad night; pulse 112; skin hot; pain of abdomen not urgent; no vomiting, but is affected with nausea.—Cont. digitalis. Horâ 4, pulse 100; feels nauseated; no pain of abdomen; interm. digitalis.

15.—Rested ill, and is occasionally griped; pulse above 100, of quick beat; no nausea.—sum. ik. digital. gutt. xij.; 3 qq. horâ. Horâ 8, interm. digitalis.

16, 8 A.M.—The tendency to vomit continues; capt. pil. ex cal., gr. iss., opii gr. iss.; mane; et ft venæsectio.—7 P.M. vomits whatever he swallows in any quantity; is molested with cough; skin hot; thirst great; tongue red; dejectiones iij.; says abdomen is not painful; pulse 112.—Iterum applicetur vesicator. epigastrio; vespere pediluvium; utr. mist. mucil. pro tussi.

17.—Rested ill; blister has not risen; cough has been severe, and continues so; dejectiones iij.; pulse 120, and not soft; cough augmented by deep inspiration, and pain produced.—Effluat. sanguis e brachio ad $\frac{3}{4}$ viij.; vespere, adhibeatur pediluvium. Cont. pil.

18.—Bad night; cough gone; respiration easy; pulse 100; skin cool and moist; no thirst.—Dejectio j. naturalis; rept. mucilag. et pil. cal., et op.

19.—Has continued easy; pulse 100; repet. pil. cal. et opii. cont. mucilag.

20 to 23.—Easy; functions undisturbed. Is allowed some strawberries and milk.

24.—Has this morning experienced a severe attack of dyspnœa, attended by cough, and pain of breast, both increased by full inspiration. Pulse 120; face flushed. Says he caught cold from exposure in the night.—Perficiatur illico venæsectio, et effluat sanguis prout vires sustulerint; utr. pediluvium vespere.

25.—Six ounces of blood drawn; surface buffy; bad night; cough, pain, and pyrexia abated this morning; Vespere, severe dyspnœa; cough and pain of breast have recurred; pulse 120.—Ex-

trahr. sang ad 3 vi. nisi virium defectus obstiterit; cont. mist mucil; iterum applic. vesicator. pectori.

26.—Relieved by the bleeding; feels easy, having slept well; pulse calm.—Dejectiones vigitalis; cont. mucilag. Ate a little meat at dinner.

27, 28.—In a fair way of recovery; and was discharged, for England, in June, with little or no complaint.

JOHN MURRAY, *Surgeon to the Forces.*

CASE 52.—Sergeant Mathews, of the 28th regt. was wounded, at Waterloo, by a musket-ball, about an inch below the umbilicus, and a little to the right side, which lodged. He walked to a village in the rear, where he remained for three days, having been bled each day, ad deliquium, before he was removed to Brussels, where my attention was particularly attracted to him, in consequence of his having passed the ball (a small rifle one) per anum, three days after his arrival, or the sixth from the receipt of the wound. The wound was healed by the end of August; and he felt so well that he marched to Paris, with other convalescents, to join his regiment. After some weeks he got drunk, and suffered from an attack of pain in his bowels, in the situation of the wound, requiring an active treatment. On attempting one day to have a motion, he found, after many efforts, that something blocked up the anus, and, on taking hold of, and drawing it out, he found it was a portion of the waistband of his breeches, including a part of the button-hole; a fact verified by Staff-Surgeon Dease, who wrote to me an account of this peculiar case. After this, the man recovered without further difficulty, although, as in all such cases, there was a herniary projection. He was afterwards subject to costiveness, to pain in the part after a copious meal, probably from the stretching of the adhesions formed between the intestine and the abdominal peritoneum, and which at first, inclined him to bend his body forwards; hence, the direction of some of the older authors to keep the body inclined backwards during the cure: a direction to be more honoured in the breach than in the observance.

In all such cases, the extraneous substance having lodged, and in wounds from balls, having destroyed, or mainly injured, in all probability, the vitality of the part which assists in the lodgment, it becomes covered with a layer of coagulable lymph, or fibre, capable of retaining it in its new situation, whence it is gradually removed by ulceration, or by the sloughing of the injured parts into the cavity of the bowel; much in the same manner as an abscess in the liver is evacuated into the duodenum, or neighbouring intestine, to which it may become attached. It is always fortunate when the canal from the external wound is cut off by the deposition of lymph, as it expedites the cure, and renders the injury less formidable; but, if this should not take place, the contents of the bowel are discharged through it, for a greater or less length of time, until the canal between the parts gradually closes and cicatrization takes place; in default of which, an artificial anus may remain in addition to the natural one, the functions of which, as well as of the bowels generally, are performed with more or less difficulty.

The latest instance of a ball passed per anum is that recorded by Dr. Cox, in the *Repertorio Medico Farmaceutico de la Sociedad de Emulacion di Barcelona*; a lad, fifteen years old, who, having been wounded by a musket-ball, on the left side of the chest, between the fifth and sixth rib, passed it on the sixth day, per anum, without having suffered any symptom of derangement of the alimentary canal, or lesion of the diaphragm. He died on the twelfth day. The ball had passed from the base of the lung into the stomach, and adhesions had formed between the diaphragm and that organ, the opening into which was round; the whole of the left lung adhered to the pleura costalis, and was infiltrated with pus.

Ancient authors, such as Ravaton, mention the passage of a round leaden bolt. Bilguer, Schenkus, Manjet, Wesler, of balls per anum. Benedictus, of part of the head of an arrow, which had entered at the back; Didier, of the end of a sword which had broken off in the belly, &c. &c.

LECTURE IV.

Treatment of hæmorrhage consequent on wounds of the abdomen; Enlargement of the external wound requisite, when the abdomen is painful, tense, and manifestly full, from effused blood; Petit fils' opinion respecting extravasation of blood into the cavity of the abdomen; Evacuation or absorption of the effused blood when in small quantity; Blood, when not absorbed or evacuated, becomes a source of irritation, and is enclosed in a foyer of fibrine, followed by inflammation and suppuration; Use of the exploring needle, or fine trocar and canula in such cases, prior to making an incision in the abscess; Cabrol's case of wound of the liver, followed by effusion of blood into the cavity of the abdomen, and consequent suppuration, the effused and secreted matters being removed by enlargement of the external wound; Argut and Petit's cases of suppuration following effusion of blood into the cavity of the abdomen, consequent on wounds; Ravaton's cases of general suppuration of the cavity of the abdomen, following penetrating wounds; Dr. Stuart's case of sword-wound of the abdomen and gall bladder, with considerable effusion of bile into the abdominal cavity; Sabatier's case of wound of the fundus of the gall-bladder, followed by free effusion of bile into the abdominal cavity; M. Biot's case of suppurating tumour in the abdomen, through which a cylinder of intestine, and faecal matter were discharged; Mr. Fryer's case of injury to the liver, with effusion of bile into the cavity of the abdomen; Dr. Archer's case of wound of the stomach, followed by suppuration in the abdomen; Dr. Fuschtius' case of intus-susception, in treating which the operations of gastrotomy and enterotomy were successfully performed; Dr. Johnson's case of internal strangulated hernia; Dr. Manlove's case of obstruction of the bowels, successfully treated by the operation of gastrotomy; Dr. Wilson's case of intus-susception, cured by operation; Dr. Maclean's case of strangulated inguinal hernia, in which the operation was performed, followed by sloughing of the bowel, and formation of an artificial anus, which ultimately closed; Dr. Bird and Mr. Hilton's case of internal strangulated hernia; Baron Larrey on effusion of blood into the cavity of the abdomen, and on wounds of the intestines; His opinions examined and controverted; Treatment of wounded intestine, the wound being readily seen or felt, and freely discharging the contents of the bowel; Experience of the surgeon of the Gend'armerie hospital at Brussels; Case of internal strangulated hernia terminating fatally; The formation of a sac or foyer round extravasations in the abdomen, very rare in natives of the northern

climates; General treatment to be pursued in the acute stage of inflammation in these cases; The practice of Continental surgeons in the treatment of gun-shot wounds of the abdomen; That practice controverted; Cases in which musket-shot wounds may be enlarged; Local treatment by ancient and modern Continental Surgeons.

As long as an incised wound in the abdomen discharges blood, its edges should be kept asunder, so that the blood may have a ready exit, unless it shall be deemed expedient to search for the wounded vessel, in order to secure it, and put a stop to the hæmorrhage. When it is presumed that this cannot be done successfully, or with advantage to the patient, whose life is in jeopardy from the continued drain, the wound should be closed, a compress laid over it, and retained by a bandage methodically applied for the purpose of aiding the muscular paries in keeping up that pressure on the viscera, which may be useful in arresting the flow of blood from the wounded part. If the bleeding should continue, and the belly become in consequence distended, the sutures being evidently so tense as to be likely to cut their way through the soft parts, or if the blood should ooze out between the stitches, they may be in part removed, in order to give that immediate relief which the death of the patient, if the bleeding should continue, can alone make permanent. When the belly becomes very painful, tense, and manifestly full, after a punctured wound, and not tympanitic from the extrication of air or the distension of the bowel, the wound should be enlarged, to allow the evacuation of the extravasated blood, which cannot in such quantity be absorbed. The orifice of a small gun-shot wound, which is not sufficiently direct to communicate with the cavity, and to allow the issue of blood extravasated in the quantity alluded to, should be enlarged to such extent as will effect this object.

Petit-fils was the first to point out, that extravasations of blood of a determinate quantity, were not diffused all over the surface and between the convolutions of the small intestines and behind them, provided the person outlived the period of extravasation; and that a general effusion into the cavity took place, shortly before or immediately after death, (see his *Memoires sur les Epanchements*, in the first and second volumes of the *Academie de Chirurgie de Paris*.)

Blood effused in moderate quantity and cir-

cumscribed by the pressure exercised upon the contents of the abdomen by its paries, may readily be evacuated by the wound, provided it be sufficiently open; and the patient will recover, if the inflammation which must necessarily ensue, should not be communicated along the peritoneum throughout the cavity, or if it should be subdued in time. If the blood be in small quantity it coagulates, and may be absorbed, but if in such quantity as that it cannot be absorbed, or from any other causes which may prevent its removal by this means, it becomes after a time a source of irritation, and nature, according to Petit and Larrey, commences early to cut it off from the general cavity, by surrounding it with fibrine. This is deposited on all the neighbouring parts, forming a pouch-reservoir, or *foyer*, the product of inflammation, which has been restrained within those bounds which admit of such formation taking place, without implicating to any essential degree the general cavity, a result which Garengot denied, and whose opinion Messrs. Velpeau and Vidal now support.

When extravasated blood is thus cut off from the general cavity, and cannot be absorbed, or by accident carried off through an opening in the bowel, a change takes place in it, by which it ceases to be bland and harmless, and which renders it irritating, thereby exciting inflammation like any other foreign body, and its ordinary consequence suppuration, if the patient should survive so long. This occurs, for the most part, after the first inflammatory symptoms have subsided, from the tenth, to the twelfth, or even a later day; when the renewal of irritation is accompanied by an increase of the general symptoms, by a more local pain, and by a circumscribed swelling of some part near the wound, in which fluctuation may perhaps be distinguished, even during the existence of the general tenderness of the whole abdomen. Under such circumstances, and when it is proposed to make an incision into this part, if it should be thought advisable to do such operation, it may safely be preceded by an exploring needle, or very fine trocar and canula, which will demonstrate the fact of the purulent and sanious depôt, without doing in such a case much mischief, if the expectations of the surgeon should not be realized. If the exploring needle should show that a bloody, purulent, or other fluid, is really distending the abdomen, no doubt ought to be entertained about enlarging the original wound, or of making a more depending opening. The treatment of the sac is to be afterwards conducted in the most gentle manner.

CASE 53.—Cabrol, of Montpellier, Surgeon to Montmorency, the Constable of France, appears to have been the first who enlarged a wound in the abdomen, for the express purpose of letting out blood and matter from its cavity. In his eighteenth observation, published in Geneva, in 1604, he states the case of a man who had wounded him-

self in the liver, from which wound he lost a considerable quantity of blood; but, as all could not escape, some gravitated to the lower part of the cavity, and gave rise to the formation and putrefaction of matter, accompanied by so horrible a stench as to be unbearable. He decided on enlarging the wound, which enabled him to remove the offending blood and matter, by the aid of the handle, and even of the bowl, of a table spoon, three times a day, until the person recovered.

CASE 54.—Petit relates the case of a soldier, under the care of M. Argeat, Surgeon to the Regiment of Normandy, who was wounded by a sword a little below the ensiform cartilage, and the edge of the false ribs on the right side. The wound was less than half an inch in extent, and only allowed the escape of a few drops of blood after every attempt made to discharge it. The day after the accident he was sent to the hospital of Besançon, and placed under the care of M. Vacher. He continued, under proper treatment in a favourable state until the night of the ninth day, when the fever returned, with tension, and pain in the hypogastric region. On the twelfth day, the belly was more tense, and elevated at a particular point, which gave on examination some signs of fluctuation. Messrs. Argeat, Vacher, &c., having agreed upon making an opening into the cavity of the belly, M. Vacher operated on the most prominent part of the swelling, an inch above the right abdominal ring, and about the same distance from the rectus muscle, making an incision two inches long through the wall down to the peritoneum, but only large enough to admit the point of the little finger through that membrane; upon which three half pints at least of black blood, mingled with some serous fluid, were discharged. The wound was dressed simply, with the exception of the introduction of a piece of linen, two inches long and half an inch wide into the abdomen. The next morning another half pint of bloody fluid escaped, and the patient began to amend. On the third dressing a little blood and pus were discharged. The cavity was injected with wine sweetened with honey, but as that gave pain, barley-water was substituted until the fifth day, when the suppuration being abundant it was omitted. The man was cured by the thirty-sixth day.

Petit himself, in a nearly similar case, did the same thing, but having delayed the operation too long, the man died he thinks of mortification of the bowels. On opening the body, he found a pint of bloody matter enclosed in a pouch, of which the cavity of the pelvis formed the lower part, the intestines adhering to each other at the upper and back part, and to the peritoneum in front.

CASE 55.—In his twenty-third observation, Ravaton relates the case of a dragoon, wounded by

a bayonet in the right hypochondrium. He suffered severely from inflammatory symptoms for several days, when the wound opened, and discharged a quantity of the most fetid matter. The wound was enlarged, and a pint of bad fetid matter mixed with pieces of omentum was discharged. The cavity of the abdomen was washed out by mild detersive injections three times a day, and large quantities were evacuated by pressing on the abdomen.

CASE 56.—Ravaton in his twenty-second observation, page 492, relates the case of a sergeant in the Regiment of St. Germain, wounded ten days before, near the umbilicus, with a sword. Under the wound in the abdominal wall he thought he felt a fluctuation, but as he considered the man to be dying, he refrained from dilating it. The next morning he found the patient inundated with black, bloody, purulent matter, which had come through the wound, which he enlarged, and thereby admitted the escape of a further quantity of a similar fluid, mingled with pieces of omentum; mild injections were thrown into the cavity of the belly to cleanse the viscera; emollient applications were made to the external wound, and the man was laid upon his face; he gradually recovered by the 57th day. The discharge was in this case so fetid, that the cavity of the abdomen had to be washed out three times a-day during the first eight days after he came under Ravaton's care.

CASE 57.—In his twenty-fifth observation, Ravaton relates the case of a soldier, who was wounded five days before, by the point of a sabre, to the right of the umbilicus. The belly, when the man was brought to him, was swelled, hard, and very painful, with vomiting, hiccough, &c., announcing the approach of death. Believing that the abdomen contained a fluid, either effused or secreted, he made an opening into the cavity immediately above Poupart's ligament, on the outside of the internal opening of the ring of the right side, when finding that nothing came from the cavity, he passed his finger upwards along the iliac vessels; and after tearing up some membranous adhesions, evacuated a pint of coagulated blood and fetid serous fluid. He then introduced a dossil of lint into the wound to keep it open, fomented and oiled the belly, round which he applied a bandage, and placed the patient on his face. The bad symptoms diminished during the night, and the patient declared himself better in the morning. From the fifth to the tenth day of the wound he was in extreme danger. On the eleventh, the bed was inundated with a purulent matter of an almost insupportable smell. The cavity of the abdomen was injected and cleansed, the ordinary dressings applied, and the greatest cleanliness observed. He was subsequently dressed three times a day in a similar manner; portions of omentum were occasionally drawn away with the forceps. His strength was well supported by every kind of nourishment. The night sweats continued until the thirty-third day, and on the

seventy-second he was discharged from the hospital cured. The discharge at first was serous, and only became purulent on the sixth day after the operation.

CASE 58.—By Dr. Stuart, in the *Philosophical Transactions* for 1728: Sergeant Menzies, of the Horse Grenadier Guards, was wounded by the point of a sword, on the 30th October, 1728, which made a triangular wound, two inches to the right of the navel, and was soon followed by great distension of the abdomen, which continued until his death on the seventh day, his bowels never having acted during that time. Pulse full, strong, and even, but not quick, until the last day, when it intermitted; skin without feverish heat; tongue natural, with a silky dryness, but with little saliva; some few occasional retchings, and hiccough; pain not noticed. During the seven days he did not sleep more than half an hour at a time, and that rarely, in spite of opiates. On dissection, the point of the sword was found to have slightly injured the omentum, and to have pierced the bottom of the gall-bladder, making a small triangular wound in it. The intestines were distended with air to three times their natural size, and about three quarts of muddy serum, highly tinged with bile, were contained in the cavity. No inflammation appeared in any part of the intestines, or other viscera, which were all sound and healthy. Dr. Stuart attributes death to the absence of bile from the bowels. It would now be attributed to peritonitis; and surgery might have done some good, by enlarging the wound, or by paracentesis of the abdomen, which might have delayed the approach of death.

CASE 59.—Sabatier, page 154, vol. 2, *Medicine Operatoire*, Paris, 1822: A man, wounded in the direction of the gall bladder, became rapidly swollen, with difficulty of breathing. These symptoms were followed by tension and pain in the right hypochondrium; pulse frequent, small, and concentrated; extremities cold; countenance pale. He was relieved by two bleedings. On the third day, Sabatier saw the belly was more elevated at the right inferior and anterior part than at any other, and a fluctuation was manifest in it to the touch. A trocar being introduced, gave issue to a quantity of inodorous, blackish-green fluid, evidently bile. The man died a few hours afterwards. On opening the body, a considerable quantity of yellow bile was found between the abdominal peritoneum and the intestines, but which was prevented from passing between the convolutions, by a quantity of lymph, which agglutinated them together. The gall bladder was empty, and the wound was in its fundus.

CASE 60.—From M. Biot and *Medico-Chirurgical Review*, for 1818.—J. B. Matheen was received into the Hospital at Besançon, for the cure of a suppurating tumour between the ilium and the

umbilicus, the opening of which gave issue to a considerable quantity of well-formed matter, and the finger could be introduced through a hole in the peritoneum into the abdomen. The opening was enlarged, and the patient kept as much as possible on his back for several days, when an aperient being given, two large lumbrici came through the wound, and the dressings for the first time were soiled with fecal matter. A new abscess, after a little time, formed within an inch of the symphysis pubis, and was opened. Six days afterwards, a membranous substance which presented itself was removed, and found to be an entire cylinder of intestine, near two inches in length. For some days the whole of the fœces passed by this wound, and also some worms; this, however, gradually decreased, the natural passage was restored, and at the end of fifty-seven days the man was discharged cured.

CASE 61.—Mr. Fryer, of Stamford, has recorded, in vol. 4, of the *Medico-Chirurgical Transactions*, the case of a lad, thirteen years old, who, in 1803, received a violent blow from the shafts of a cart, in the region of the liver, which was followed by the severest symptoms common to such accidents. On the fourth day he was completely jaundiced, although the general symptoms had in part diminished. Ten days afterwards, the sinking of the abdomen had increased, and fluctuation was perceptible. Twenty-one days after the accident, he was apparently sinking fast, the belly being greatly distended; it was, therefore, thought desirable to introduce a trocar and canula, to evacuate the distending fluid, which being done, thirteen pints of what appeared to be pure bile were removed. Twelve days afterwards, fifteen pints more were drawn off; and, nine days afterwards, thirteen more. Eighteen days afterwards six pints more were taken away; after which he gradually recovered. The fluid drawn off was not examined chemically.

CASE 62.—Dr. Archer, of Maryland, has recorded, in the *New York Medical Journal*, vol. xv. p. 215, the case of a man wounded by a knife, which entered near the cartilages of the false ribs on the right side, and penetrated the stomach, touching the cartilages of the opposite side. The external wound was three inches long, that in the stomach two inches. His dinner was discharged through the cut, and some escaped into the cavity. The external wound was stitched up, but the ligatures were removed in forty-eight hours, and the wound dressed simply. On the ninth day, pain was felt in the groin, suppuration took place, the part was opened, and a large quantity of pus, mixed with pieces of cabbage, was evacuated. The man then got well, with a hernia of the stomach, which would appear after eating or drinking, and recede when the stomach was empty.

CASE 63.—Dr. Fuschstius, in Hufeland's *Journal* for February, 1825, reported in Johnson's

Medico-Chirurgical Review for the same year, relates the case of a labouring man, who suddenly felt a dragging pain in the umbilical region, whilst collecting wood in the district of Olpe. Not being relieved by the means employed, Dr. F. saw him four days afterwards, and continued the remedies, with venesection, &c., until the eighth day; when, convinced that the symptoms depended on some mechanical obstruction, as a swelling as hard, and nearly the size of the fist, could be felt about the angle formed by the ascending and transverse portions of the colon, he proposed an operation, as the sufferer seemed to be beyond all hope of recovery by any other means; and performed it on the tenth day, by making an opening at the outer edge of the rectus muscle, to the extent of from two to three inches. He then introduced his hand, smeared with oil, into the cavity, and after some search, discovered a hardened part in the ileum, opposite where the tumour had been felt externally. This part of the intestine he drew out; it was neither inflamed nor distended, but contained in its cavity a soft compact mass, which could be felt as far as he could follow the intestine. He distinctly ascertained an intussusception, but could not reach the commencement of it, so as to bring it out; and, therefore, opened the gut, to the extent of two inches, rather than the opening in the abdomen (which would now be considered a great error), when a portion of the invaginated intestine was brought into view, which he succeeded in unfolding, to the extent of two feet. There were not any traces of inflammation, or of any of its consequences, to be seen. The wound in the gut was closed by six stitches of the glover's suture, the ends of the silk thread being brought out of the wound; the integuments were closed by the interrupted suture, and the patient put to bed, broth and gruel only being given alternately, for some days. A natural motion took place two days after, and on the fourteenth day, the man was cured, and remained well. Dr. F. says, Nuck performed a similar operation, and that it is recorded in Haller's *Disputationes*. There are many cases recorded, and I have seen two myself, in which an incision into the cavity of the abdomen would have led to the removal of the immediate cause of death.

Dr. Johnson in commenting on the case of Dr. Fuschstius, mentions that of a young man, who when with Belzoni in Egypt, had suffered from peritonitis, and ever afterwards from long continued constipation. Seized some years after in London, by pain, after lifting a heavy weight, followed by stercoraceous vomiting, dreadful colicky pains, and great distention of the abdomen, he died at the end of ten or twelve days, unrelieved in any way. On examination of the body, a portion of the ileum was found entangled under an old band or *bride*, formed possibly in Egypt, and was easily drawn out, but a regular

internal strangulated hernia had been the consequence. The intestines above were greatly distended, but there was no inflammation that could fairly account for the patient's death. Dr. Johnson says, he had not the smallest doubt that the operation of gastrotomy would have removed the evil.

CASE 64.—Dr. J. Manlove, in the *Boston Medical and Surgical Journal*, for July, 1845, relates the case of a coloured boy, seventeen years of age, on whom, in consequence of an enormously distended abdomen, with great difficulty of breathing, anxiety, and confined bowels, for twelve or fifteen days, threatening immediate death, he made an incision in the linea alba, commencing about two inches below the umbilicus, and extending for four or five inches towards the pubes. The peritoneum and intestines had formed an intimate union along the lower half of the incision; and in separating them, the intestine was wounded to the extent of a quarter of an inch: through this came flatus, fæces, turpentine, &c., to the great relief of the patient. The wound was closed by suture and bandage, except at the part opposite to the wound in the intestine, through which the contents were discharged until the 17th day, when the bowels acted naturally, and the lad recovered.

The reporter, in advocating similar operations, adduced the case of a Negro, who being supposed to be about to die of intus-susception, had the abdomen opened by Dr. Wilson, and the intestines drawn out of the cavity, until the point of obstruction was discovered. An inch of the ileum was found invaginated; this having been relieved, the intestines were returned, and the patient recovered.

These last two cases show that much more may be done, in many constitutions, than is usually attempted, and that nothing should be neglected, when there is a reasonable chance of success.

CASE 65.—Thomas Mc. Mahon, 76th Regiment, aged 22, was admitted into the Garrison Hospital, Portsmouth, upon the 13th of June, 1845, with all the symptoms of strangulated inguinal hernia of the left side, of two days' standing.

The remedies of every description employed having failed and the symptoms becoming more urgent, I performed the operation. Considerable difficulty was experienced, from some strong adhesions existing between the intestine and hernial sac, the former of which was perfectly black. The adhesions were gently broken up, and the parts returned in the usual manner. The patient experienced immediate relief, and all the symptoms of an urgent nature appeared to be arrested; as however there existed considerable tenderness of the abdomen upon pressure, fifty leeches were immediately applied with the most decided benefit, and in the evening a little castor oil was given, which the following morning acted gently upon his bowels; from that time everything went on favourably, till the morning of the fourth day after the operation, when he made a sudden effort to

go to the closet stool, (although ordered not to do so) which was immediately followed by the descent of a considerable portion of intestine and omentum, accompanied with profuse hemorrhage from a small artery on the surface of the intestine, which was taken up and tied, and the parts returned into the abdominal cavity. The greatest excitement followed, with every symptom of acute inflammation. These were treated by general bleeding to the extent of fifty ounces, and sixty leeches to the abdomen, with other antiphlogistic remedies. It was, however, evident from a slight discharge of fæculent matter from the wound in the inguinal region, that serious mischief to the bowels had taken place; and upon the morning of the 17th day from the performance of the operation, a piece of intestine came away with the fecal contents of the bowels, after which the patient experienced relief in all his symptoms, and appeared to gain health and strength, and after a time the wound seemed disposed to close, three weeks after the sloughing of the intestine. The bowels were opened per anum, and the wound was allowed to heal up, the natural functions, we hoped, being fairly established; but, upon the sixth day, all the evacuations ceased, attended with acute tenderness of the abdomen, which began to swell fast. The means adopted had not the slightest effect in relieving the symptoms, and the patient was considered past relief. At this period the idea suggested itself to me of cutting into the abdomen, and making an artificial anus, as the only hope left for the patient. I accordingly made an incision over the site of the former wound, and carefully opened the intestine, to the extent only to allow the tube of the stomach pump to be inserted, when there was an immediate discharge of flatus and some fæculent matter, and the patient expressed himself relieved. By the further use of the stomach-pump apparatus, I was enabled to extract a quantity of fæculent matter by the artificial opening, and after some hours the patient was completely relieved from the dangerous symptoms he was suffering from. The artificial opening was left open for two months, when the bowels again gave evidence of acting naturally. The artificial wound was not, however, closed till the 22nd of August, 1845, a week after the bowels appeared to act freely and naturally.

The patient from this time got well and strong, and was discharged to his duty, upon the 10th of October, 1845, since which period he has continued to perform all the duties of a soldier most efficiently, and without experiencing any inconvenience to his general health or constitution. On or about the 6th October, 1846, he died of inflammation of the brain, at Fort George, in Scotland. On dissection, the abdominal viscera, including the intestinal canal, appeared perfectly healthy; but on a minute examination of the

portion of small intestine (found to be the ileum) situated in the inguinal region of the side operated upon, and directly opposite to the cicatrix of the external wound, it was discovered to be firmly attached to the abdominal parietes by an adventitious membrane, to the extent of two lines, which then diverged, and formed itself into a canal of a funnel shape for about five inches and a quarter in length, and of a homogeneous structure, which united itself with the continuous intestinal tube. By this wonderful provision of nature, the healthy functions were uninterruptedly carried on, and permanently continued, without any pain or detriment to the patient's general health. On appearance, Jan. 23, 1847.—A. MACLEAN, M.D. Late Surgeon, 76th Regiment.

In all these cases, when in any way recoverable, warm fomentations, the occasional application of leeches, opiate embrocations, with enemata regularly administered, instead of aperients, do good, in addition to the operative methods enumerated, and which ought to attract particular attention.

I am indebted to the kindness of Mr. Curling for the following abstract of a case read before the Royal Medical and Chirurgical Society, on 9th Feb., whilst these sheets were passing through the press.

CASE 66.—Dec. 21st, 1846; Dr. Bird was called to Bocking in Essex, to see Mr. C—, a young gentleman 20 years of age. Eight days previously he was as well as usual, having merely had constipated bowels, for a couple of days, when in the morning whilst in bed, he became sensible of a slight dragging, or sense of giving way, about two inches to the right of the umbilicus, towards the spine of the ilium.

This sensation was soon replaced by a sense of soreness and tenderness. During the following six days, nothing passed from the bowels except with the aid of a copious enema. Purgatives and a tobacco enema, failed in procuring stools. Three days previously sickness commenced. A sense of uneasiness and distress was produced by firm pressure on the spot where the dragging was first felt. The abdomen was flat and collapsed. On enquiring it appeared that when a child he had been the subject of mesenteric disease, and some years afterwards of an ailment, supposed from the symptoms to have been peritonitis. The absence of hernia, as well as of any previous hæmorrhage from the intestines, or of exposure to the influence of lead, the improbability of the presence of malignant disease, proved the non existence of the most ordinary cause of insuperable constipation. Recollecting the dragging sensation, and previous existence of peritonitis, Dr. Bird ventured to give an opinion, that the mechanical obstruction depended upon a knuckle of intestine having become strangulated in some manner, under a band of false membrane. The character of the vomited matters, and the empty state of the cæcum and

colon, at once referred the seat of obstruction to the small intestines. Trial was made of metallic mercury, after which the pain and vomiting ceased, and no important change occurred until Dec. 25th; when the pain and vomiting returned. The propriety of an operation was entertained, and Dec. 28th, the writer requested the assistance of Mr. Hilton, for that purpose, and they arrived at the patient's house at 9 o'clock p.m., being just fifteen days from the commencement of the illness. The abdomen was scarcely more distended than on the 21st, but the muscles were more irritable, assuming a state of spasmodic contraction on the slightest manipulation. No great uneasiness experienced on pressure. Pulse 90, skin soft and cool, and tongue moist. The patient was placed in a room, in which a temperature of 88° to 90° was maintained.

Mr. Hilton states, that having arrived at the same conclusion respecting the nature and seat of obstruction as that described by Dr. Bird, he fairly represented the various arguments and facts for and against an operation to the patient, who expressed himself decidedly desirous of the attempt being made to relieve him. An incision was made from the median line to within an inch of the pubic symphysis, and the abdomen opened. Several convolutions of distended and congested small intestines so completely blocked up the opening, that it was necessary to enlarge the incision for about one inch and a half above the umbilicus. After dividing a band of adhesion between two portions of small intestine, and making a careful search in different parts of the abdomen, Mr. Hilton found on the right side about six or seven inches of ileum in a state of strangulation, having passed through an annular opening, formed in part by another portion of the same small intestine, and by some old membranous adhesion to the brim of the pelvis, over the external iliac blood vessels. By gentle traction on the strangulated intestine, at the opposite side of the opening, through which it had passed, Mr. Hilton succeeded in liberating it from its incarcerated position. The intestines were replaced with some difficulty, and the abdomen was closed by a continued suture. After the operation, which lasted about an hour, the patient was somewhat collapsed, but there was not any marked anxiety of countenance. He afterwards became restless and delirious, and died about nine hours after the operation. On examination of the body several strong, cellular adhesions were found between the convolutions of the intestines. The cæcum and colon were distended with feculent matter.

Mr. Hilton regards the direct results of the operation as very satisfactory, and in a surgical aspect successful. The hiccough and vomiting ceased, the obstruction was relieved, and feculent matter had passed as far as the upper part of the rectum. So long as any doubt remains as to the

seat of obstruction, the author thinks it the safer plan to adopt the median section of the abdominal parietes.

The language Baron Larrey has made use of on these points, in his last observations on wounds of the abdomen, is by no means precise, or consistent with his usual clearness. He maintains, in his 2d vol. p. 372, Paris, 1829, after Sabatier (see vol. 2, page 147, Paris, 1822), "that when the divided vessels are not of considerable size, the blood effused is concentrated in a spot, more or less large, around the wounded vessel, constituting a pouch or foyer, for its maintenance." With reference to wounds of the intestines, the Baron says, page 374, "Supposing that the ileum, or the colon, has been wounded in a part of its tube, &c., its contents escape through the wound, or accumulate in the foyer, or pouch, to which I have already alluded, without communicating with the cavity of the abdomen; an admirable provision of nature, pointing out to the surgeon the course he ought to pursue under similar circumstances. I have avoided, therefore, seeking for the portion of intestine wounded, for the purpose of bringing it to the edge of the external wound, by means of a thread passed through the mesentery, or for that of uniting the divided parts by suture." The Baron here, I apprehend, confounds with each other two distinct periods of time; that of the moment of injury, and extending from it perhaps to the first twenty-four hours before inflammation has commenced, and made some progress; and the second period, which follows for several days after inflammation has set in, after fibrine has been effused, and the inflammation as far as human foresight can estimate it, has in part been subjugated. No educated surgeon would open a wound for the purpose of breaking up adhesions, with the hope that he might find the wound of the intestine, which must then be in an unfavourable state for applying a suture. The time has past for such proceeding, and patient and surgeon must abide the result, be it what it may. The real question is, and it may not be shirked, what is the practice to pursue when called to a wounded intestine, discharging freely its contents, within four hours after the accident, and the wound in which intestine can be seen or felt, with or without a reasonable enlargement of the muscular paries of the abdomen. Is the intestine to be left to nature, or is it to be drawn out, and the opening closed by suture. Baron Larrey has wanted experience on these points, and I have not been more fortunate. He has decided in favour of doing nothing, to which, I regret to say, I cannot assent. Many cases are recorded of recoveries under these circumstances, whilst few relate those cases which were unfortunate, although it is notorious that by far the greater number of persons so injured, die within the first few days after the receipt

of the injury. Mr. S. Cooper says, in the Elizabeth Hospital, at Brussels, of a part of which only he had charge, after the battle of Waterloo up to the 27th of the same month, there were two protrusions of a large portion of the stomach, three of the bladder, and ten or twelve of the mesentery, intestines, or omentum. In the other parts of this hospital, as well as in the other hospitals, these kinds of cases were just as numerous; and it may be asked what became of them. The answer is a very simple one. They nearly all died. It is probable they always will do so, under similar circumstances of misery, neglect, and little surgical assistance; but how far a similar result would have taken place under different circumstances, and an effective surgical treatment, may be doubted.

The following extract from a report of the Staff-Surgeon, in charge of the Gensd'armerie Hopital à Bruxelles, after the battle of Waterloo, into which 259 badly French wounded were admitted, between the 29th of June and the 3rd of July, corroborates this statement. Nine only of many who were known to have been wounded in the abdomen, had survived to that time. Of these five died within the first five days after their admission, the other four have done wonderfully well. In one case of the four, the ball entered immediately under the umbilicus, and passed out on the left side, two inches above the crest of the ilium. It may perhaps have run along the canal of the transverse arch of the colon, as the contents of the intestine which were much tinged with bile, passed by both openings. The symptoms were never severe; nothing was done for the first few days, and very little afterwards, beyond great quietude and a very low diet. If the small intestines were wounded, they must have rapidly formed adhesions to the surrounding parts. Blood passed in the first instance with the evacuations, which soon became very regular; the discharge from the wound gradually ceased, and the man, who was much wasted, fast recovered his health and strength.

The other three cases were very similar in their nature and treatment, but they all eventually died.

The case, No. 27, of M. Baudens is in point, and I apprehend, that it will be advisable to follow the example he has set us, in all cases from gun-shot, in which it is manifest that a large opening exists in the bowel, that can be easily attained by a simple enlargement of the external parts. When this is not possible, greater reliance must be placed on the efforts of nature. When the external wound has been closed, and it is evident from the firm distension of the abdomen, that effusion or extravasation has taken place, it should be re-opened, and enlarged if necessary to the desired extent. If symptoms of irritation should occur at a later period, accompanied by swelling, tension, and pain, with anything like fluctuation, the exploring

needle should be used in the manner I have already alluded to.

CASE 67.—In the year 1804, when in Halifax, North America, two soldiers were brought to me at the hospital, labouring under symptoms of enteritis; one from drinking a large quantity of new rum, the other without any very obvious cause. The first, a very strong man, was cured by depletion, carried nearly to the utmost extent. The second, Patrick Dogherty by name, died, under a combination of the best regulated means I was acquainted with, on the morning of the third day. He thought he had strained and hurt himself in some ordinary exertion, which he knew he was generally unable to undertake, in consequence of a previous attack of inflammation of the belly, some two years before, from which time he had suffered from constipated bowels. On examination after death, I found a portion of the ileum strangulated by a noose or bridle, which had been formed on the former occasion, and through which the gut had passed, and had become strangulated. The intestine above was greatly distended, the part was inflamed, and the bowels agglutinated to each other; the cavity contained a quantity of serous fluid and fibrinous shreds, indicating a high degree of inflammation. An operation at an early period might, I *then* felt, have relieved the patient, but I equally felt I had no grounds upon which I could have acted in doing it; for if ever an operation for opening the belly for the disentanglement of a piece of intestine, can succeed in Englishmen, it must be in the state of incarceration as distinguishable from strangulation, and before inflammation has set in with any degree of intensity.

Cases of extravasation, or of effusion, terminating by the formation of a sac, pouch, reservoir, or *foyer* surrounding it, whilst the rest of the cavity remains free from inflammation, are so rare in natives of our northern climates, that I am indisposed to infer that they do take place, except as very accidental circumstances. The different facts related however, should be borne in mind, and surgery should not be wanting in giving its aid, under all well considered and reasonable circumstances. It is easier to do nothing, than to think and to act.

The general treatment to be pursued in the acute period of all these cases of inflammation, has been sufficiently marked,—antiphlogistic to the utmost extent consistent with propriety, by bleeding, leeching, and cupping. The repeated administration of enemata, the early exhibition of mercury and opium, and subsequently of gentle aperients.

Continental Surgeons, and by pre-eminence Baron Larrey, who is followed on this point by most French surgeons, inculcate the necessity of enlarging the wounds made by a musket-ball

in the wall of the belly, although the Baron is particular in confining it to the muscular parts; and M. Baudens, one of the latest writers on the subject, points out the additional tendency it gives to the formation of hernia, and exposes therefore the soundest reason for not doing it without an especial reason. When a slip of the muscular or tendinous structures interferes with the quiescence of the wound; when it is desirable to introduce a finger to make an examination; when it is necessary to divide a portion to allow the restoration of protruded parts, I apprehend no one will doubt the propriety of the direction. But when neither these nor any other good or sufficient reasons can be given for such an operation as that of enlarging the wound, (*debrider la plaie*) simply because it has been usual so to do, at the risk of making a large hernial protrusion instead of a smaller one, I do not understand why it should be done, and therefore, infer that it is unnecessary. It gives rise to some bleeding, but that is really nothing; it makes a cut instead of a hole, by which nothing essential is gained; and as this enlargement of the wound can always be accomplished when it may become necessary from a sufficient cause, I forbid, as far as my opinion may be deserving attention, such an interference, especially on the fore part or the sides of the abdomen.

When a musket-ball, passing across the abdomen, comes out behind through the thick muscles of the back, with perhaps a slit-like opening in the skin, through which some urine, and perhaps fecal fluid or matter may also pass; such wound should be enlarged both superficially and deeply. There is here an object to be gained, and the operation is necessary. I have no objection to its being done when it is even supposed that these fluids or matters are likely to be soon, or ultimately discharged through it; as it is desirable that any secretions or effusions which cannot be evacuated by the natural passages, should have every reasonable opportunity offered of making their escape.

The ancient surgeons were devoted to various kinds of balsams, the inventions of André de la Croix, Arceus, &c. &c. which they spread on the wound, and over the abdomen; later continental surgeons to embrocations of oil of almonds, with camphorated spirit of wine, beaten up with whites of eggs: oil of almonds and tincture of opium, in equal parts, make a soft application to parts which are uncovered, or are protruded and cannot be returned; and an excellent one when the belly is distended and painful. Larrey has recommended the inside of the hide of a recently killed goat or sheep, of which I have had no experience.

LECTURE V.

Abnormal or artificial anus; Of rare occurrence in Great Britain and Ireland; Its surgery hitherto principally French; Mode of formation of artificial anus; The valve or septum in the orifice of the lower end of the bowel; The valve occasionally wanting; When the valve is absent, or of small size, the external wound may heal under moderate compression; Formation of the funnel-like pouch by the elongation of the adhesions between the intestine and wall of the abdomen; Desault's mode of treating artificial anus: Forget's introduction of a bent gum-elastic tube into the intestine, so as to compress the valve, and cause its removal; Schmalkalden's mode of destroying the valve by ligature; Practised successfully by Dr. Physick and Dupuytren; Dupuytren's forceps for the relief of artificial anus; Laldemand's case, in which he performed the operation, with the post-mortem appearances seven years afterwards; Modification of Dupuytren's forceps by Delpech, Liotard, and Blandin; Raybord's grooved forceps; Jobert's mode of applying the forceps; Autoplastic operations; Description of M. Velpeau's operation; Mr. Trant's propeller; Treatment prior to and after the operation for artificial anus; Wounds and injuries of the liver; Distinction between inflammation of the peritoneum lining the abdomen, and of that covering the viscera; Symptoms of wounds of the liver; Wounds of the gall-bladder fatal, unless it be adherent to the peritoneum from previous inflammation; M. Huttier's case of musket-shot wound of the gall-bladder, the ball being found in the gall-bladder two years after the receipt of the injury; M. Paroisse's case of sabre-wound of the liver; Dr. Roches' case of wound of the liver; Sir S. Barns' case of musket-shot wound of the liver, with injury of the rib, followed by repeated attacks of inflammation of the liver; Dr. Hennen's case of musket-shot wound of the liver with fractured ribs; Dr. Blicke's case of gun-shot wound of the liver; Mr. Bruce's case of gun-shot wound of the liver; Mr. Ryan's case of musket-shot wound of the anterior edge of the liver; Mr. Guthrie's cases of musket-shot wounds of the liver; Dr. Amedee Roux' case of stab of the liver; Removal of protruded portions of the liver; Blanchard, Dieffenbach, and Macpherson's cases; Comments on this practice; Wounds of the stomach usually fatal; Symptoms and treatment of simple wounds of the stomach; When the external wound is large enough to admit the wound in the stomach being seen, it should be brought together with the continuous suture; When the contents of the stomach are poured out through a small external wound, it

should be enlarged, and the wound in the stomach closed; Treatment of musket-shot wounds of the stomach; Hevin's cases of stabs of the stomach; Case of suppuration of the stomach; Anxiety, a symptom generally attendant on dangerous wounds of the abdomen; Fistulous openings in the stomach, consequent on wounds of that viscus; Dr. Beaumont's case; Dr. Watson and Ploucquet's collections of such cases; Hevin's cases of knife swallowing; Hevin's case of the pig-tail passed into the anus; Circumstances requiring the operation of gastrotomy, and directions for its performance; M. Frizac's case; Incised wounds of the stomach rarely met with during the war; Gun-shot wounds not infrequent, and generally fatal; Injuries of the spleen usually fatal; Protrusion and extirpation of the spleen, through a wound in the abdominal parietes; Wounds of the spleen from stabs commonly fatal; Treatment of wounds of the spleen; Wounds of the kidney less fatal, but scarcely less dangerous than those of the spleen; Mr. Guthrie's cases after the battle of Waterloo; Fatal case of wound of the ureter or kidney, sigmoid flexure of the colon, and spine; Fatal case of wound of the kidney, and of the intestine; Wounds and injuries of the spermatic cord; Cases of musket-shot wounds of the spermatic cord and testes; Removal of the injured testes; Treatment of consecutive hæmorrhage; Passage of a catheter as a point on which pressure can be made; Injuries of the urethra and their treatment; Wounds of the penis.

Abnormal or Artificial Anus.—In some few cases, not only of wounds of the intestine, with or without loss of substance, but of strangulated hernia, the continuity of the bowel is not sufficiently re-established; the external wound remains open, and becomes indurated and fistulous, giving passage to the fecal matters, and rendering the sufferers very miserable. These cases are of rare occurrence among the hardy natives of Great Britain and Ireland, who seldom outlive the processes ending in mortification; and little has been consequently done, or even recommended in this country for the relief of this misfortune. Its surgery has been, until lately, entirely continental, and principally French, from the time of La Peyronie, Louis, and Sabatier, who first drew attention to the subject, unto Scarpa, Desault, and Dupuytren, who demonstrated a rational means of obtaining a cure.

When an intestine has lost a more or less considerable part of its substance, at a particular

spot, and an artificial anus is about to be formed, it adheres to the peritoneum, around the inside of the external wound, although the adhesion is of little extent or width, and forms but a narrow barrier, for the protection of the cavity of the abdomen. The upper end of the bowel is more open than the lower, whose calibre is contracted in size, and is sometimes even difficult to find; whilst its opening is partially closed by a sort of septum extending across, or from where the two portions of a divided gut have come irregularly in contact with each other by their sides, without uniting in the first instance in their length; or from the falling in especially of the posterior part of the lower end, to which the upper has become united. The projection thus formed in the tube, is called by the French *eperon*, or *promontoire*, valve, ridge, or septum; it directs the fecal matter through the external wound, whilst it obstructs the passage into the lower part of the bowel. There is generally great difficulty in ascertaining the fact of the existence and exact situation of this valve during life, in distinguishing the upper from the lower end of the intestine, as well as the nature and extent of the adhesions by which the intestine is retained in its situation. If the absence of such a valve can be satisfactorily made out, and it is sometimes wanting,—the external opening may be successfully closed by compression, or by operation. If the valve should exist, its removal by a preliminary operation is necessary, and has been attempted in France with various, but somewhat doubtful success.

Where the valve is wanting, or of small size, or appears to offer little obstacle to the passage of the contents of the bowel from above, the external wound usually heals under a moderate degree of compression. When a portion of small intestine has been lost by mortification or otherwise, and the patient has recovered, with an unnaturally situated or artificial anus, the intestine, although at first in contact with the wall of the abdomen, is gradually in many cases, though not in all, retracted into the cavity—it has been supposed, by the dragging of the mesentery upon it, at the point of union of the divided extremities outside where the *eperon* or valve is formed; and it is said that this dragging has even led to the gradual disappearance of the valve, admitting thereby of the contents passing more readily from the upper part of the intestine into the lower, and consequently laying the foundation of a cure. This dragging on the intestine, or its movements under the different motions of the body, in some cases causes an elongation of the membrane formed under the adhesive process, by which the intestine is attached to the inside of the wall of the abdomen, in the same manner as adhesions are elongated between the pleura pulmonalis and the pleura costalis, and a sac or pouch is thus formed be-

tween the cut ends of the intestine and the fistulous external opening, which Scarpa was the first fully to demonstrate and explain, and which he called an *entonnoir*, *infundibulum*, or funnel. If then, in an old case, a small portion of the wall of the abdomen were removed, in the form of a V, the internal opening at the apex of the V, if small, would be made into a sort of funnel; whilst the outer incision would remove all the hardened fistulous parts; an operation which sometimes requires to be done, when the external opening is not free, and fecal matters have insinuated themselves between the aponeurotic parts, giving rise to abscesses, and other small fistulous openings in different directions. It is necessary to bear the formation of this pouch in mind, as well as of the valve, in order to understand the operations proposed for the relief or cure of this complaint.

If simple compression should fail in the first instance to prevent the passage of the feces which never can be thoroughly controlled, from the want of a sphincter, and the uncertainty of pressure, the method of Desault may be adopted. This consists in gradually dilating the external wound, so as to enable the operator to discover the open ends of the bowel, when a tent is to be introduced into the inferior end, and afterwards into the upper, being fastened by a thread passed around its middle. A pyramidal shaped pad is then to be placed over the opening, and compression made by bandage upon it, so as to press the whole inwards. The size of the tent is to be gradually enlarged, until the contents of the gut begin to pass downwards with ease, when a well adjusted pressure is to be made on the fistulous opening only, to prevent all oozing from it, until the internal parts have time to close.

It was proposed by M.M. Forget, and Columbe, in 1824, to introduce a gum elastic tube, a little bent, into the intestine, which would then press on the valve, and cause its removal. This operation was however found difficult of accomplishment, causing serious accidents when attempted, and was even fatal in its results, which led to its abandonment.

In 1798, Schmalkalden, in his Thesis entitled *Nova methodus intestina uniendi*, proposed to destroy the valve, by introducing a ligature through it, and by gentle tightening allow it to ulcerate its way out. The difficulty arose as to how the needle and thread should pass through its base, without doing other and serious injury. It was done successfully by Dr. Physick, of Philadelphia, in 1813, and Dupuytren tried the ligature with success, but he subsequently invented a pair of forceps, consisting of a male and female branch, to be applied separately, on each side of the valve, or *eperon*, to the extent of an inch, or an inch and a half at most, when they were to be closed by a screw, until they compressed the part between them sufficiently, to destroy its life.

The separation of the valve included within the forceps would take place by the usual processes of ulceration in its immediate proximity, and by adhesion of the parts external to the bowels, to those surrounding them. This inflammation however, did not always stop at the adhesive stage, and death has been the result, as well as a successful cure. Professor Lallemand* following the example set by Dupuytren, performed this operation on John Cyprien, forty-six years old, of Montpellier, who suffered from artificial anus, the consequence of strangulated hernia, and who died seven years after the operation. On examining the body after death, "a portion of ileum was found adhering to the left inguinal region, in that of the cicatrix, by two slender columns; one, four lines long by two in width, contained a canal of communication between the fistula and the cavity of the intestine, which soon assumed the funnel shape, and was lost in the cavity of the bowels. When that was laid open, a slight prominence marked the place where the valve or *eperon* had existed before the operation for its removal." The intestine on the whole presented very little appearance of the injury it had sustained. Delpech, Liotard, and Blandin, have endeavoured to improve upon the forceps of Dupuytren, but they have not been able to remove its defects. M. Raybord invented an instrument like a pair of forceps, having a groove within, along which a cutting blade could be passed to divide the valve. M. Jobert directs the forceps to be applied for only forty-eight hours, and after a day or two's delay, to allow of new adhesions being formed external to the bowel, in consequence of the inflammation thus excited, the valve is to be divided by a pair of blunt-pointed scissors. It is said, that each of these methods has succeeded, but they must all be very dangerous in their application, that of Dupuytren not excluded, which has on the continent the greatest number of supporters. The reports of its success must, however, be received with some reservation, as unsuccessful cases have not always been recorded. When the external opening is principally in fault, the canal of the bowel being uninterrupted, and compression has failed, attempts have been made to fill up the opening by operation, and by the substitution of a new piece of integument from a neighbouring part. *Autoplasty*. The different attempts made in this way, have failed for the most part, and gave rise to the method of Mr. Velpeau, which having been successful, is certainly deserving of repetition. The operation is thus described by himself: — "I included and removed the whole of the fistula in a double elliptical incision, made obliquely towards the centre, so as not to include the intestine, or at most only the mucous membrane of its opening. I afterwards introduced four sutures, two lines

from each other, taking care that neither should penetrate into the cavity of the abdomen, or that of the intestine. An incision was then made about two inches in length on each side of the elliptical ones, at the distance of about an inch and a quarter through the integuments and aponeurosis of the external oblique muscle. This enabled the sutures to bring the edges of the first or elliptical wound accurately together; the hollow left by the separated parts of the second incision was filled with lint, to insure its edges being well kept asunder. The operation was performed on the 13th November, 1835, and on the 18th it became necessary to cut the ligatures, in order to allow the contents of the bowel to escape, and the operation was supposed to have failed. The wound, however, gradually closed in, and the patient was discharged cured, on the 8th of February. The two external incisions relax the edges of the elliptical incision so much, that they are readily brought together by a gentle traction of the ligatures which may be lightly tied together. A retaining bandage is not necessary, but absolute rest in a recumbent position should be steadily enforced. An enema should be administered every morning for eight days, or till the ligatures come away.

Mr. Trant has invented an instrument he calls a propeller, for pressing back the *eperon*, an account of which he read before the Surgical Society of Dublin, on the 26th of April, 1845, which is reported in the Dublin Medical Press, of May 14th, 1845. He has used this in one case with complete success, the patient being previously in a very emaciated state, and likely to die from inanition. The instrument by its formation admits of being passed through the artificial anus, and of being placed on the *eperon*, at the bottom of the wound, where it can be retained for a considerable time without producing the slightest inconvenience. It does not whilst in the intestine offer any obstruction to the passage of the fecal matters flowing along the cavity of the tube. It acts as a forceps in retaining the anterior wall of the intestine in close contact with the posterior surface of the abdominal parietes, whilst the propeller is pressing back the *eperon* towards the spine; consequently the danger of separating the delicate adhesions in this situation is prevented, which might otherwise cause a fatal extravasation into the cavity of the abdomen. The paper is accompanied by a wood-cut representing the instrument, which was made by Mr. Reed of Dublin, and merits another trial, being apparently less dangerous than the other methods recommended in cases fitted for its use. Whatever may be the method employed for the cure of an artificial anus by operation, it cannot be doubted that the patient must be exposed to all the dangers which may result from inflammation, for which he must be prepared before-hand, and the symp-

*Repertoire Generale d'Anatomie, &c. tome 7, page 133.

toms of which must be met and subdued as they arise; or if this cannot be accomplished, the mechanical means, if any are used that can be taken away, must be removed, and quiet if possible, restored by their abstraction, and the treatment adopted. In successful cases a small aperture will frequently remain, constituting a fecal fistula, instead of an artificial anus. This will sometimes become irritable, inflame, ulcerate, or burst, discharging the solid contents of the bowel, although on the subsidence of the irritation the part under pressure usually returns to its former state.

Wounds and injuries of the liver, whether incised or penetrating, occurring from blows or from musket-balls, are very serious, although not necessarily fatal. Some few persons recover altogether; some few with more or less of permanent disability. The remainder die during the first, or inflammatory stage; or in the secondary one, which follows, from the twelfth or fourteenth day, after the primary symptoms have in some measure subsided.

In all cases of penetrating wounds of the abdomen, the peritoneum must be injured, and undergo a certain degree of inflammation, which is marked by its peculiar symptoms; to which are added, those dependent upon any of the viscera which may be implicated by it. The peritoneum is not of itself a vital organ, in the true acceptation of the term, and only becomes so when it is intimately connected with one. Thus, the peritoneum lining the parietes of the abdomen, is by no means of so much importance in the animal economy, as the peritoneum covering the intestines. This inflammation, inertly treated, is usually fatal at the end of from twenty-four to forty-eight hours; whilst acute inflammation of the abdominal peritoneum may continue for twice forty-eight hours without causing death, and often becomes a chronic disease. When the inflammation of the peritoneum extends to the organ which it covers, the symptoms are combined, and in wounds, are characterized by the issue of the peculiar secretions or contents of the viscera. The symptoms which ensue after a wound of the liver, are those common to inflammation of the cavity of the abdomen, with the additional ones peculiar to the organ superadded; pulse often smaller, and less perceptible, than in peritonitis; discolouration of the skin, eye, and urine, amounting even to jaundice, although this is not an immediate symptom, neither is it always present. The pain is not confined to the part, but extends to the umbilicus, whilst the pain symptomatic of inflammation of the liver, viz., pain in the top of the right shoulder is early felt, and is often accompanied by cramps of the muscles of the arms, and numbness of the fingers. The usual symptoms of anxiety and depression are present, and the stomach shows, by its irritability, that it has partaken of the

shock given to the system. The bowels are usually confined, but I have known blood passed from them, when it was not supposed that the stomach or intestines were wounded; the discharge from the wound is either of blood or bile, or both, mixed with a serous effusion, which afterwards becomes purulent. Wounds of the gall bladder are, as far as it is known, fatal; the effusion of bile which immediately takes place giving rise to inflammation, which, with other causes, destroy the sufferer at the end of a few days. If the gall bladder should adhere to the peritoneum from any previous inflammation, a wound in it need not prove mortal, as effusion would be avoided, and there is no reason to believe that an injury to this part would be otherwise more vital, than that of any other of the viscera of the abdomen.

CASE 68.—M. Huttier, of Chalons-sur-Marne, states that he cured a soldier of a wound made by a musket-ball, which entered the abdomen on the right side, and lodged. Two years afterwards, the man died of a affection of the lungs; and on opening the body, the ball was found in the gall-bladder, which had no appearance whatever of having received any injury, there being no mark or cicatrix upon it. The man, during the course of the treatment, was jaundiced, and for a long time afterwards had a yellow tinge on his skin.

CASE 69.—Poroisse, in his *Opusculs de Chirurgie*, relates the case of a soldier, wounded in a duel, by a sabre, which made an opening between seven and eight inches long, in the wall of the abdomen, and another in the liver, two inches long, and half an inch in depth. The man lost a quantity of blood, and appeared to be dying. The wound, filled with coagulated blood, was cleansed of an enormous mass, by which the respiration and circulation appeared to be relieved. The edges of the external wound were placed in contact by compress and bandage, without suture, and the man laid on the injured side, to allow the discharge a free passage; he was bled four times within the first eighteen hours, acid drinks were allowed, enemata administered, and anodynes; the belly was fomented, the discharge was serous, yellow, and bloody. A tent was kept in the lower part of the wound. On the sixth day suppuration was established, and it became necessary to support the strength of the patient; the colour of the skin and of the urine had been jaundiced from the first. After several vicissitudes the man gradually recovered, and on the twenty-sixth day was pronounced convalescent. M. Poroisse attributes his success in this case to the care he took to evacuate the extravasated blood in the first instance, and to prevent its diffusion in the cavity of the belly afterwards, by keeping the wound open. The skin for a long time retained its yellow tinge.

Cabrol states in his 18th observation, that Dr. Roches of Tarrascon had cured a soldier named Charles Pin, of a wound in his liver three fingers wide, and that he had the opportunity of verifying the fact by seeing the cicatrix after his death from a different cause.

CASE 70.—Lieut.-General Sir S. Barns, when Lieut.-Colonel of the Royals, a man of a spare habit of body was wounded at the battle of Salamanca, by a musket-ball, which injured the cartilages of the false ribs, a portion of the rib being removed, and passed out, injuring the liver. A bilious discharge continued several weeks from the wound, and his life was saved with great difficulty. It was during this period that I saw him. The wound ultimately closed, and he was enabled to return to his duties, although suffering from a dragging pain and weight in his side, which any exertion increased. In the autumn of 1819, he was attacked in the most serious manner by acute inflammation; the pain in the right side extending over the stomach and down to the umbilicus was constant and acute, and increased on pressure; the pulse very small, indeed scarcely perceptible; the extremities cold and uncomfortable; the countenance depressed and anxious; bowels confined; stomach rather irritable. A number of leeches were applied, and other remedies administered. The constant pain, which was increased by pressure, could only be relieved by loss of blood, although every other symptom seemed to forbid depletion. Dr. Forbes kept his finger on the pulse, whilst I abstracted twenty ounces of blood from the arm, which caused a diminution of the pain, and gave relief for an hour, when it returned, and twelve ounces more blood were taken away with the most beneficial effect; a blister was applied over the part, and a dose of calomel and opium was repeated. Shortly afterwards he became tranquil; the extremities lost their coldness; and although the pain continued in a slight degree for several hours, and much soreness remained for many days, he quickly recovered. Two months afterwards, he had another and equally severe attack, in consequence of walking about two miles rather hastily, from which he was relieved in a similar manner. Whenever he bent his body a portion of the rib appeared to press in upon the liver, and often gave him acute darting pain; and one day, on pulling on his boot in haste, and with some bodily exertion, a third attack ensued. In order to prevent the bending of the body forward, and to confine the motion of the liver, which seemed liable to injury from the irregular points of bone which could be readily distinguished above it, stays, made with iron plates instead of whalebone, were adapted to his body, and from these he derived great comfort. The substance of the liver did not appear to be materially affected by the inflammation, but the treatment, as far as regards depletion, was not less vigorous than it

would have been had the organ itself been more particularly implicated; the difference would have been, a more protracted chronic state of illness, and a longer medical treatment.

CASE 71.—Lieut.-Colonel H. was wounded by a musket-ball, at Quatre-Bras, which entered behind, about two and a half inches from the spine, partially fracturing the eighth and ninth ribs, passing out between the seventh and eighth anterior in front, and about four and a half inches from the stern. The hemorrhage was great, and continued for three days. On the 11th, he was removed to Bruxelles; his pulse was then about 90, and hard; his countenance pale and sunk; his eyes glazed; his skin of a dusky yellow, and bedewed with a clammy sweat; the tongue foul; respiration difficult, and interrupted by frequent singultus. He had great sense of pain and weight in the region of the liver, but his severest complaint was an inability to remain in one posture, and want of sleep. He had occasional, but not violent cough, and expectorated some coagula of blood. On examining the posterior wound, I found a copious, glairy, yellowish discharge, mixed with air-bubbles, and some small streaks of blood; the anterior wound was nearly closed. He had been bled five times before his arrival, and the removal rendered the further loss of blood, to thirty ounces, necessary during the night.—12. Low and weak; pulse 81, and fluttering; tosses incessantly in the bed, and speaks incoherently; discharge very copious, thick, and of a deep bilious tinge; belly hard, and bowels confined; coughs up, with great difficulty, a tenacious yellow mucus, of bitter taste and offensive smell.—12th day. All the symptoms became aggravated, and he was bled to twelve ounces, which gave great relief. The edge of the wound, for about an inch round, was emphysematous. Up to the 24th of July, or the 37th of the wound, very little hope was entertained of his recovery; after which, he slowly improved. On the forty-first day, the discharge from the wound changed in a most remarkable manner, being not one-fourth in quantity, and having lost its bilious hue. A few spiculæ of bone came away from the posterior wound, and by the 1st of September he had quite recovered.

JOHN HENNEN, *Staff-Surgeon*.

In publishing this case, which I saw, it is just to the late Dr. Hennen to say, that, like all the other Staff-Surgeons at Brussels and at Antwerp, he offered to send me all the cases he had kept of wounds of the chest and abdomen. I suggested to him that he might derive advantage from publishing them separately, as Dr. Thomson was about to do, and, by this means, bring himself more under the observation of Sir James McGrigor, which advice he followed.

CASE 72.—Corporal Macdonald, 1st battalion, 79th regiment, was wounded, on the 16th June, at Quatre-bras, by a musket ball, which entered

the abdomen, splintered the eighth rib on the right side, passed through the liver, and was supposed to have lodged on the opposite side, as he says he felt the ball strike the left side, on which he was not able to lie for a long time. Lost little blood at the time; was dressed superficially, and arrived in Brussels on the 19th, labouring under considerable fever; pulse quick and hard; skin hot; tongue dry; respiration short, laborious, and painful; bowels confined since the 16th.—Venæsectio ad $\frac{3}{4}$ xxxvj; magnes. sulph. $\frac{3}{4}$ j. statim. For seven successive days the bleeding was repeated, from twelve to sixteen ounces each day, when a large, bilious, and purulent discharge took place from the wound, on which the inflammatory symptoms appeared to subside; and he continued in a quiet state until the 30th of June, when bleeding took place from the wound, in the night, to the extent of twenty ounces, and ceased spontaneously. He then appeared to be doing well, until the 15th July, when the hæmorrhage recurred with so much fever, as to warrant twenty ounces of blood being taken from the arm, which was repeated next day. He took a saline cathartic every morning during the whole course of his illness. The bilious discharge ceased in the middle of August, and, on the 2nd September, he was discharged convalescent; the only material inconvenience he suffered from, being a shortness of breath on any great exertion.

W. F. BLICKE, *Staff-Surgeon*.

CASE 73.—Thomas Dobson, of the 2d Battalion, 2nd Foot Guards, received a gun-shot wound, on the 18th June, at the battle of Waterloo, which entered about three inches above the umbilicus, in the right side, wounding the liver, as was evident from the discharge of a fluid of a green colour, and in consistence resembling bile, and for which he had been bled. But little else had been done, until he came to Antwerp, on the 29th of June. He then complained of pain in the region of the liver, extending to the shoulder; countenance anxious; tongue white; eyes yellow; pulse quick and hard; belly tumid and constipated. Twenty-four ounces of blood were drawn from the arm, and a cathartic mixture, of infus. of sennæ and sulphate of magnesia, was desired to be taken, until some effect was produced. The abdomen was fomented, and simple dressings applied to the wound.

June 30.—Feels easier this morning; had evacuations during the night, and some sleep; pulse full, but soft; skin hot; says the pain has greatly diminished; countenance improved; eyes still yellow; tongue white; some cough; discharge of bile diminished. He was ordered a mixture of liq. ammon., acet., and antimonial wine every three hours, and the purgative mixture occasionally, to obviate costiveness.

July 1.—Discharge from the wound considerably abated, and consists of pus, mixed with a

small quantity of dark fluid; tension of the abdomen subsided; some cough and expectoration, which he says has an unpleasant taste; eyes clearer; tongue clean; pulse 80, soft, and equable; the external wound is healthy, and granulating.

2.—His medicines were continued. Has some fever this morning; severe cough, with little expectoration; some sleep; tongue clean; bowels open; wound doing well; healthy pus is discharged. Ten ounces of blood were taken from the arm, and the mixture continued.

3.—Is perfectly free from febrile action this morning; and says he has no pain in the part, except when his body is erect; eyes clear; appetite capricious; some debility; bowels open; tongue clean. The mixture was continued.

4.—Continues to mend; wound improving; the ball has not been traced. Adhesive plaster was applied to the wound, the discharge having diminished.

7.—No particular occurrence has taken place during the last two days; the wound continues to do well; his general health improving gradually. He was desired to take some infus. of cinchona, acidulated with sulphuric acid.

Aug. 2.—This man continued to improve daily; his appetite gradually increased, and the wound was healed to within a quarter of an inch in circumference. The hospital being broken up, he was sent to Brussels this day.

SAMUEL B. BRUCE, *Surgeon to the Forces*.

Antwerp, August 24, 1815.

CASE 74.—Lieut. Edward Hopper, 1st battalion 38th regiment, was wounded, by a musket-ball, on the 9th December, 1812. It passed through the anterior edge of the liver, and, glancing round the ribs, was cut out about two inches from the spine.

On his being wounded, he could scarcely believe his shoulder was not the part affected. His pulse was rapid and intermitting; breathing hurried and laborious; and in a short time the tunica conjunctiva became yellow. He was *very largely* bled, and received an emollient injection (which produced no effect); and warm fomentations were applied to the abdomen, from which, and the bleeding, he received some temporary relief; but, in consequence of his removal that night to the rear, his symptoms were much aggravated on the morning of the 10th. He complained of acute pain over the whole abdomen, increased on pressure; vomiting; quick, hard, and wiry pulse (no pain referred to the wound). The bleeding was repeated ad deliquium; warm fomentations and enema also repeated; and he was ordered to take the saline mixture, with *very few* drops of tincture of opium in each draught, to allay the irritability of his stomach. On the following evening he appeared much better. Vomiting had ceased; and his pulse

was considerably fallen, and less hard; pain of abdomen less general, and more confined to the seat of the wound; urine deposited a copious sediment, and appeared mixed with blood. On the 11th, after passing a very restless night, the pulse again rose; his abdomen became tense, but not very painful; and he made ineffectual efforts to stool. He was again bled, less largely than before, a large blister was applied over the abdomen, and an ounce of castor oil, with peppermint, was given immediately. On the following evening he was much relieved. The blister acted well, and the purgative gave him three copious stools, of dark and fetid fæces. On the 12th, after having more rest than usual, he complained particularly of his wound, with twitching pains, referred to the right shoulder; and was ordered, during that day, one grain of calomel, with two of antimonial powder, to be taken three times.

Jan. 13.--Was free from pain during the day; pulse fuller, and less frequent; urine clear; tension of abdomen subsided. The calomel and antimony were continued; and, as his wound discharged freely, he took some light nourishment. From this day, a gradual amendment took place. The calomel was continued until his mouth became slightly affected; and, as his bowels were in general torpid, from the deficient secretion of bile, a mild purgative was given every two or three days, as occasion required; and an ounce of the infusion of calumba, with quassia, three or four times daily. His wound is now nearly healed; but, from the shattered state of his constitution, caused by this, and a previous dangerous wound he received at St. Sebastian, his recovery is likely to be very tedious, if ever perfect.

C. RYAN, *Surgeon 38th Regt.*

Bidart, near Bayonne, Jan. 7, 1813.

CASE 75.—A soldier of the 4th regiment was struck by a musket-ball, at Albuhera, on the upper part of the right hypochondrium, over the liver, which came out behind, at a point immediately corresponding to that in front. Blood and bile were discharged from the wounds in considerable quantity, and his case was considered to be hopeless. Brought to me, at Valverde, the next day, he was largely bled several times, the wounds were simply dressed, and he was kept perfectly quiet, and his bowels gently open. The skin became of a yellow colour, his strength failed under the treatment, and he became thin, and looked ill. At the end of three weeks he was sent to Elvas, where he gradually improved, and was forwarded thence to Lisbon and to England, with his wounds healed.

CASE 76.—An officer was wounded in one of the battles in the Pyrenees, by a musket-ball, which penetrated the outer part of the right hypochondrium, at the edge of the false ribs, and lodged. Blood and bile flowed in con-

siderable quantity, his skin became yellow, the pain and swelling of the abdomen were considerable, and he was given over as lost. Under a very vigorous and careful treatment, he lingered for some time, and gradually recovered, so as to be sent to England, with a fistulous opening at the orifice of entrance. I examined the wound in 1817, three years afterwards, and found that a large blunt probe passed inwards towards the stomach, for the distance of five inches, where it ended apparently in a sort of sac. Purulent and bilious matters were constantly discharged from the wound; his countenance was sallow; his digestion bad; he suffered from constant uneasiness, if not pain, and was altogether out of health. I saw him once annually for several years, and at last found that I could generally strike the ball with the probe; that he frequently, after an attack of pain and derangement, passed matter by stool, when the oppression and uneasiness about the wound ceased. I had hopes the ball would some day pass through the opening thus made, and had thought of enlarging the external wound, and of endeavouring to extract the ball by a long pair of forceps. He ceased at last to pay his annual visit, and I suspect he died in one of the attacks I have alluded to, now more than twenty years ago. This ball must have passed very close to, if it did not penetrate the gall-bladder.

I have never had the opportunity of extracting a ball from the liver during life, although I have removed some after death, at the end of several days. I have seen persons live, however, many weeks, into whose livers balls had penetrated; and I was acquainted with at least three persons who had been wounded through the liver, and in whom little subsequent inconvenience was occasioned.

CASE 77.—Dr. Amedée Roux, called to a servant of Prince Demidoff, who was wounded by the thrust of a knife, to the extent of nine inches, found him in a state of syncope from loss of blood, and saw a cut on the liver of four fingers width, from which blood poured out most profusely. He immediately closed the external wound by four sutures, supported by long straps of adhesive plaster. Several bleedings followed from the part, and the bandages had to be removed as they occurred. On the evening of the next day, the skin assumed a yellowish tint, and peritonitis supervened thirty leeches were applied, followed by fomentations, which had the best effect. The abdomen continued distended, but less tender. The dressings were saturated with blood. On the third evening the bad symptoms returned, when the bandages were loosened to admit of a discharge of blood from the distended cavity, which continued all night, and relieved all the bad symptoms. On the fourth day this discharge continued, the bowels were opened as he lay for the first time

by castor oil. On the fifth day he was better on every point. On the eleventh day the sutures were loose, and were removed. On the fifteenth day, having walked round his bed, the edges of the wound separated, and showed the edge of the liver, which rose up into the wound, but gave rise to no inconvenience, and the man was cured on the thirtieth day.—*Bulletin de l'Académie Royale de Médecine*, tome 10, p. 812.

Portions of the liver have been removed in some instances; in one case, related by Blanchard, in his *Anatomia Practica Rationalis*, 1638, a small piece of liver was removed by the forceps. Dying of fever three years afterwards, a small piece of the liver near the external wound, was found wanting. Dieffenbach gives a case in his *Journal*, in which a small protruded portion was cut off with scissors, without any bad consequences. Dr. Macpherson, in the *London Medical Gazette*, for Jan. 1846, has related the case of an Hindoo, a large piece of whose liver protruded through a wound an inch in length, made by a spear in the right hypochondriac region. A ligature was applied tightly around its base, and the piece cut off, rather than make such enlargement of the wound as might allow of the restoration of the protruded liver. The arteries bled from the cut surface, and required to be tied, and a double ligature was put through the stump of liver and tied on each side. This part was not pushed back into the abdomen, but allowed to remain in the wound. The symptoms were mild, the ligatures came away on the ninth day, and the man returned to his home in three weeks.

I consider these cases to be exceptions to the general rule, which directs the return of all protruding parts, and apprehend that the division of the external or tendinous expansion of the wall of the abdomen, without or with little enlargement of the cut in the peritoneum, would have facilitated the reduction. The retention of the part from which the piece was cut off, within the divided parts of the wound, was agreeable to the principles I have inculcated with respect to all cavities.

Wounds of the stomach are usually fatal, although some persons escape when these injuries are confined to its anterior and upper surface, and do not penetrate both sides, in which case effusion into the cavity of the abdomen, and consequent inflammation, can scarcely fail to ensue. Case No. 5, of Sir J. Elley, is perhaps among the simplest wounds of the stomach after which recoveries take place; and it is fortunate for the patient when they occur, that the stomach should be empty. If it should not be so, the contents may possibly be ejected shortly after the receipt of the wound, but it is not advisable to excite vomiting by remedies, or means adopted for that purpose. In a healthy person, the prospect of the stomach being emptied in the natural way,

without extravasation taking place through the wound, is greater than if brought on by artificial means, and the vomiting is less likely to continue. In a perfectly quiescent state, the general compression of the contents of the abdomen by its walls, may prevent effusion under ordinary circumstances, and this state should be maintained as rigidly as possible. The apparent course of the wound indicates the probable mischief, which is confirmed by vomiting of blood, great anxiety, depression of countenance, a cold clammy skin, pain in the part, hiccough, and by a discharge of its contents, if the wound is sufficiently open to allow it; pulse low, and sometimes intermittent, if the collapse is great. If no effusion or passage of the contents of the stomach should occur, the external wound, if an incised one, should be closed by suture, and the patient kept in the utmost state of quietude, in an elevated position, leaning a little towards the wounded spot, the abdominal muscles being relaxed. Neither food nor drink should enter the stomach, although thirst should be allayed by wetting the tongue and mouth. The bowels should be relieved by enemata, and the belly fomented. Bleeding and leeching, as frequently repeated as the symptoms appear to require, must be carried to the greatest extent that can be permitted with safety.

When the external wound is so large as to enable the wounded stomach to be seen, the cut edges of the wound in it should be brought together by the continuous suture, as in the intestines; and the external wound should be closed in a similar manner, the end of the ligature on the wound of the stomach being cut off close to the stomach, and that organ being left perfectly free, with the hope that the thread will be carried into its cavity, whilst the outside adheres to the peritoneum opposed to it.

When the stomach pours its contents through an external opening, too small to allow of its being examined, it is desirable that this wound be enlarged, if a doubt be entertained of the passage being free. It is a sufficient reason for such operation to allow the opening in the stomach to be seen. It is very probable that effusion will take place into the cavity of the abdomen if it be not done, and the death of the patient will follow. It is very probable he will die if it be done; and, therefore, in such cases little has been hitherto attempted. I am of opinion, however, that, in the case I have last alluded to, a blunt hook may be sometimes introduced through the wound into the stomach, so as to keep it stationary whilst the external opening is carefully enlarged; and that it ought to be done in such cases, and the wound in the stomach closed, in the manner recommended. I have never had a case under my care in which I could have done this; but I have seen some die on whom it might have been done, and it de-

serves to be considered, when surgeons shall be in sufficient numbers on a field of battle to attend to such recommendations, and to the after treatment these cases require.

When the stomach is injured by a musket-ball, and its contents are discharged externally, the edges of the wound not being in a condition to unite, must remain open for several days. The person should be placed in the mean time in the most easy and comfortable position, which may enable the contents of the stomach to be readily passed out externally, if they shew any disposition to be thus evacuated. The external wound should be dilated as far as the peritoneum, if it should require it, so as to admit of the passage being direct, and symptoms must be awaited, and treated as they arise. If the patient should survive the first or inflammatory stage, he should be supported by clysters, composed of strong beef or veal broth, given five or six times during the twenty-four hours; and when it may be expected that the wound in the stomach has closed, or that the injured portion has adhered to the neighbouring parts, warm jellies and light broths may be frequently given, in small quantities, but solid food should be forbidden until complete recovery has taken place. I have seen inattention to this precaution in more than one instance prove fatal.

CASE 78.—Hevin relates, in the first volume of the *Mémoires de l'Académie de Chirurgie*, a case treated by M. Coghlan, Surgeon-Major of the Hospital of Belle-isle, which deserves attention, from the quantity of blood lost, and the ultimate recovery of the patient from a wound by a sword, three fingers' width, below and to the side of the ensiform cartilage. Whilst M. Coghlan was preparing to probe the wound, the man threw up a quantity of food, beer, and blood. This was soon followed by a chamber-pot full of blood, which removed a sensation of weight he felt at the stomach. This vomiting of blood recurred four times, at an interval of two hours between each. Apparently about to die, recourse was had to a strong solution of alum, which was given to him after each vomiting of blood, and the bleeding was stopped after the third dose; a smaller dose was afterwards given to him, every half-hour. No blood passed with a motion he had in the night. The next day he was bled three times, and the alum was continued, the patient recovering on the seventieth day; having lost, by calculation, twelve pints of venous blood by vomiting, and taken two ounces and a half of alum during the period of its occurrence; on the efficacy of which remedy great reliance seems to have been placed. Hevin afterwards says, he was informed by M. Carterat, that he was called to a peasant, struck by a knife in the epigastric region, which had made so large a wound as to enable him to draw out the stomach, the contents of which were discharged through a cut in its superior part. This

wound he sewed up by the glover's suture, returned the stomach to its place, and then stitched up the external wound, applying over it a compress and bandage. The man was placed on his belly, and bled several times. The next day, the external wound had nearly united; no bad symptoms followed, and on the fourth day he went out to his business.

The symptoms of the participation of the organ, even when the inflammation extends to suppuration, when unaccompanied by a wound, are not always so distinct as to be pathognomonic.

CASE 79.—A soldier quartered in the Strand barracks, in 1816, was taken ill after some irregularities, and was confined to bed one day, without his illness being reported. On the second day, he was seen by the usual medical attendant, and on the third, was sent to the York Hospital, Chelsea, complaining of intense burning pain at the stomach and umbilicus, always present, and increased on pressure, although sometimes more violent than at others. The stomach rejected everything, the bowels were constipated, the pulse quick and small, countenance expressive of great anxiety and pain. On the third day after his admission he died, active depletion, and all the other usual remedies having been employed in vain. On opening the body, I was surprised to find no marks or signs of inflammation on the intestines near the umbilicus, to which the greatest pain had been referred, and to see the stomach much enlarged, of a whitish colour, and so changed from its natural appearance, as to resemble the thick smooth part of boiled tripe. On cutting into it, I found it nearly as thick, in consequence of the cellular membrane between its coats being loaded with matter resembling pus, which could be easily pressed out, leaving a honey-combed appearance, in addition to the universal thickness of the stomach, which was evidently in an equable state of suppuration throughout. Portions of this stomach I gave to the late Dr. Hooper, in whose collection, now in King's College, and in that belonging to the Medical Department of the Army, at Chatham, the only known specimens of this disease were at that time to be found. If there be a symptom more generally observable than another in all cases of dangerous wounds of the abdomen, it is anxiety—it is not only of the mind, as shewn by the countenance in a very expressive manner, but of the body, as demonstrated by great uneasiness. In some cases it is a more certain sign than the pulse of great mischief; in others more distinctive than pain, which is sometimes referred to a part unaffected; and is in all indicative of the necessity of a corresponding attention on the part of the practitioner; for while it is present, although other symptoms be mild, the patient is in imminent danger.

Fistulous openings have been known to follow wounds of the stomach, and to remain for years. The case related by Dr. Beaumont of the American

Army, of C. Martin, who in 1822 received an extensive wound in the stomach, which became fistulous, admitting of a variety of most interesting enquiries being made into the process of digestion, is remarkable. The stomach has been opened surgically, and with success, for the extraction of knives, which had been foolishly swallowed for bravado or gain by the sufferers.

Dr. Watson in a Memoir on Organic Obstructions of the Oesophagus, published in the eighth volume of the American Journal of the Medical Sciences for 1844, has collected many instances of fistulous openings into the stomach, and of incisions made into it accidentally or purposely for the removal of knives, &c.

Ploucquet in his *Bibliotheca* has enumerated near a hundred writers under the head of "Pantophagus," who have related such cases, and as many more under the heads of *Vulnus* and *Ventriculus*. Hevin in the first volume of the Memoirs of the Academie de Chirurgie, has related some of the most interesting cases of those who had swallowed knives, &c., by design or by accident to his time. One gentleman swallowed a silver fork, another a silver spoon, a third fifteen gold medals, all of which after a certain lapse of time were discharged per anum. Of the *cultrivores* and others, whose stomachs were opened and the knives removed with success, there are many instances. The most ridiculous story of the whole of those which Hevin has collected, is an instructive one. Some young students desirous of punishing a young woman who had offended them, cut short the hair of the tail of a large pig, and when frozen hard, forcibly pushed it up her anus, leaving a couple of inches only hanging out of the small end or tip. The hairs having been cut short, caught in the gut when the tail was attempted to be drawn out, and gave her inexpressible pain. The most serious symptoms followed during six days, and every attempt having failed, Marchettis was applied to. He prepared a hollow tube, two feet long, and large enough to receive the thickest part of the pig's tail, to the end of which he fastened a strong waxed cord, which he drew through the tube. He carefully introduced the tube into the anus, pushing it over the pig-tail, until he drew the whole of it into the tube, which he then brought away including the tail, to the great relief of the sufferer; a mode of proceeding which has lately been brought forward as new and important, with respect to introducing one catheter over another into the bladder.

The necessity for an operation so grave as that of opening the stomach, must be shewn by the presumed impossibility of the foreign substances being dissolved, or of their passing out of it by any other means, whilst the continued distress they occasion more than equals the risk which is likely to be incurred. The offending substance ought to be felt through the wall of the abdomen, and the incision for its removal should be made

between the recti muscles in the linea alba, unless the foreign body has actually pierced the stomach, and is felt to the outside of the rectus muscle, at which part the incision ought to be made obliquely in the direction of the fibres of the external oblique muscle, all bleeding vessels being secured before the peritoneum is opened. This being accomplished, the protruding body should be extracted by such enlargement of the opening in the stomach as may be actually necessary. M. Frizac of Toulouse is stated by Baron Larrey to have done this successfully; but when the substance does not protrude, although it can be felt through the wall of the stomach, it will be advisable if possible, to draw it towards the upper or smaller curvature of the stomach rather than to the lower, avoiding the coronary vessels, and taking a medium distance for the opening from the cardiac orifice, and thereby such advantage as may be derived from gravitation. The wound in the stomach should be united by the continuous suture, and the external wound should be closed in a similar manner. The patient ought to be kept in bed, in an easy erect position.

Incised wounds of the stomach were rarely met with during the Peninsular war. Gun-shot wounds were not infrequent, and were generally fatal; so much so, that whilst Baron Percy estimates the successful cases as four or five out of twenty, I am not disposed to calculate upon more than half that number.

Injuries of the spleen have been usually fatal, from hemorrhage filling the general cavity of the abdomen, especially when they have arisen from rupture of that organ, which I have several times seen occur in consequence of falls, or from blows from cannon-shot, which have not opened into the cavity or exposed the viscus. Wounds from musket-balls have, for the most part, destroyed the sufferers, either from hemorrhage or from inflammation. I have not seen nor heard, during the Peninsular war, of a wound in the abdomen through which the spleen protruded, and the patient recovered. Instances have occurred in which this part has been removed in man after its exposure by injury. A case is said to have taken place after the battle of Dettingen, in which the spleen, covered with dirt, was cut off, and the patient recovered. In another case, the spleen, found without the wound at the end of twenty-four hours, was cold, black and mortified. The surgeon placed a ligature above this part, and cut off three inches and a half of the spleen; a large artery was tied, and the remaining portion of the viscus was returned into the cavity of the belly, the ligature hanging to it, and the patient got well.—*Fergusson in Phil. Trans.* vol. xl. 1737-8.

Wounds from stabs with a bayonet, or a sabre or long pointed sword, are commonly fatal, either from hemorrhage or from inflammation. I have, however, seen cases of wounds from stabs and

from musket-balls which ought to have injured the spleen, from which the sufferers recovered; and I have seen accidentally after death, cicatrixes in the spleen corresponding to external marks, indicative of a former wound. The treatment in all such cases should be to encourage the discharge of blood from the part, in the first instance; then to close the external wound if an incised one, to place the patient on the injured side, and to subdue all unnecessary inflammation, by bleeding, leeching, absolute rest, and starvation. The application of warm fomentations, where an oozing of blood may be expected to take place, cannot be recommended, and cold should be substituted, if agreeable to the feelings of the patient. When the blow or wound does not cause the death of the individual by hemorrhage or acute inflammation, a chronic state of disease may supervene, which, if not duly combated, will ultimately destroy him. The early administration of calomel and opium, and the repeated application of blisters, will in these cases as well as in those of the liver, be of the greatest service. Effusion, or suppuration may take place as well as in those cases which have been noticed, when other of the viscera have been injured; and although instances of such terminations are not recorded, it does not follow that they have not taken place.

Wounds affecting the kidney have been less fatal than those of the spleen, although they are scarcely less dangerous, from the complications by which they are attended; the successful cases on record are not numerous, and the practice to be pursued can only be general. The results, when not fatal, have been for the most part unknown, from the patients either lingering on, or recovering after they have been discharged from the service. I saw two cases after the battle of Waterloo, of this nature. In one, the ball had passed through the abdomen, entering a little below and to the left of the umbilicus, and coming out behind nearly opposite, and close to the spine. No fecal matter was discharged from the front wound, but some came though the posterior one, accompanied by a small quantity of urine, indicating a lesion of the kidney, or ureter at its upper part. The symptoms at first severe, had subsided under proper treatment, and there was every probability that the sufferer would eventually recover, although I was unable to trace the case, after the man left Brussels. In the other, pain was principally felt in the testis, and the spermatic cord of the side injured.

CASE 80.—Charles Quin, of the 1st battalion, of the 11th foot, was wounded at the battle of Toulouse, on the 6th of April, 1814, by a musket-ball, which entered on the right side at the end of the false ribs, and came out at the opposite side of the back, thus passing across the abdomen diagonally. He was supposed to be killed, and was left as a hopeless case, until he began to revive the next

day, and to complain of pain, when he was bled largely and relieved. The urine was mixed with blood which passed also by the bowels, indicating a wound of both bowels and kidney. The antiphlogistic treatment was vigorously continued until the 13th, when he was brought into the Minime Hospital in the town, from the hospital in the field, where he lingered until the 23rd., and died seventeen days after the receipt of the injury.

Dr. Hennen has related the case of an officer, who was wounded in the kidney, whom I saw. I transcribe the essential part, as it was reported to him, because it contains subsequent matter, with which I was unacquainted.

CASE 81.—An officer was wounded on the right side, on the 9th December, 1813, the ball being cut out behind; his case was considered hopeless. An hour afterwards, on being moved to the fire, he desired to make water, and then passed what appeared to him to be a quantity of blood. Carried to the rear, on a waggon, for three leagues, he suffered beyond description; passed bloody water again, and on his arrival in quarters, was bled, and had an enema administered. He then became delirious; was bled several times, had blisters applied to the abdomen, suffered from pain at the top of the right shoulder, and took no other nourishment but tea for fourteen days. He gradually recovered, and at the end of seven weeks, was sent to England. After remaining some time in London, he joined the *dépôt* of his regiment. In consequence of this exertion, he suffered an attack of fever and peritoneal inflammation; and a tumour formed in the site of the posterior wound, which was opened, and discharged several ounces of matter, of an urinous odour. Another abscess formed, and was opened. During this time, he suffered great pain, became greatly emaciated, the urine diminished in quantity, with the frequent calls to pass it. He lingered in this state until the end of July. The flow of matter from the wound was great, and of an urinous smell. The desire to make water was incessant, passing only by drops, and bringing him to a state of frenzy; the discharge from the wounds, which had been lessening for two days before, suddenly stopped; the pain and pressure of urine became intolerable; he remained at last in a state of the greatest torture for about three minutes, when, during an effort, a burst of urine took place, coloured with blood, forcing out with it a hard lump, shaped like a short thick shrimp, three quarters of an inch long, which proved to be next day, when examined, the cloth which had been driven in by the ball. It must have passed from the pelvis of the kidney, or the ureter, into the bladder. It was hard, was covered by a black crust, and was thought to be a stone when passed. It could not, however, have been long in the bladder, or it would have been covered by the triple phosphates, and have

formed the nucleus of a calculus, requiring to be removed by operation.

CASE 82.—Le Capitaine Negre, of the French Infantry of the Line, was struck on the left side, above the hip, at the battle of Albuhera, by a musket-ball, which went through the upper part of the sigmoid flexure of the colon, and came out behind, injuring apparently the fourth and fifth lumbar vertebrae. As urine came through this opening, the ureter or lower part of the kidney must have been wounded, and as he had lost the use of one leg, and much of that of the other, the spinal marrow must also have been injured. He was left on the field of battle, supposed to be about to die, and was brought to me, to the village of Valverde, three days afterwards, in the most distressing state. The inflammatory symptoms had been and were severe; they were however subdued, but his condition from the want of almost every comfort, common to him and all others, after that the bloodiest battle in British history, was to be deplored. The pain he suffered on any attempt to move him was excessive, the discharge of feces from the anterior wound, and of urine from the posterior one, and by the usual ways, rendered him miserable, and he at last implored me to allow the box of opium pills, of which one was given at night to each man who stood most in need of them, to be left within his reach, if I would not kindly do the act of a friend and give them to him myself. He died at the end of ten days, after great suffering, constantly regretting that our feelings as christians, caused their prolongation. I have had several cases somewhat of a similar kind, but without injury of the spine, at different times, after the battles in the Peninsula, and some few have apparently recovered, after a lapse of time, by the efforts of nature alone, without any specific treatment.

When the ureter is wounded, comparatively little blood is passed with the urine through the urethra, and this remark will extend to the pelvis of the kidney, after the first days; when blood continues to flow, tinging the urine for a longer period, the vascular part of the kidney has been injured.

CASE 83.—A soldier of the 57th Regt. was wounded at the battle of Albuhera, by a musket ball, which entered above the hip on the left side, and lodged; he passed bloody urine for four or five days, repeatedly, and in small quantities; he had lost the use of the left leg, and suffered great pain; blood also passed with his motions, indicating a wound in all probability of the large intestine. The flow of urine by the urethra at last ceased, the bladder became distended, and his sufferings induced me to pass a catheter, which drew of a quantity of very bloody urine, mixed with coagula. He died the day afterwards. The urine was probably secreted in a great measure by the uninjured kidney. I have never had a case of wound of the kidney, in which there was

either time or opportunity to make those examinations of the urine, which modern science would require in a well conducted treatment.

Wounds of the spermatic cord, are of infrequent occurrence, and rarely lead to fatal, although often to inconvenient consequences.

CASE 84.—On the heights of Rolicca, in the first battle which took place in Portugal in 1808, a soldier of the 29th Regiment, was wounded by a musket-ball, which passed from the outer and lower part of the buttock on the left side, and came out at the inner and upper part of the thigh, passed across the upper part of the scrotum, divided the spermatic cord, and slightly injured the penis in making its final exit. Little inflammation followed, although a good deal of ecchymosis took place, and some swelling of the testes ensued, which ultimately subsided, and he recovered, with the presumed loss of the function of the organ on that side, which gradually diminished in size.

In another case at Talavera, nearly similar, a small ball passed through the testis, at its upper and anterior part, and went through the anterior part of one corpus cavernosum. The patient recovered without much inconvenience, beyond a little loss of substance at the part injured. The bleeding was not material in either of these cases, nor was it great in any others that I have seen.

CASE 85.—John Dunn, 1st battalion, 79th regiment, was wounded on the 16th of June, at Quatre Bras, by a musket-ball, which passed through the scrotum, testicle, and upper part of the thigh or groin of the left side, and came out behind through the nates. He was bled, and treated antiphlogistically, no urgent symptoms followed, and he was discharged cured on the 31st of July.

CASE 86.—A private of the third division was wounded at the affair of El Boden, in front of Ciudad Rodrigo, by a small musket-ball, which passed through the testis and scrotum, and through the back part of the opposite thigh. Carried to Sabugal, he remained under my care a month, under very moderate treatment, and suffered but little from inflammation, when he was sent to the rear nearly well.

I have removed the bruised and shattered remains of a testis and epididymis to expedite the cure, and I have been obliged to do so at a later period, in consequence of the wounded portion becoming enlarged and diseased. These occurrences are rare; the wound in the testis usually heals kindly, the portion which remains, however is probably of little use, although the patient does not like to lose it.

I have not had occasion to tie an artery even when the penis has been as good as amputated. If bleeding should take place in the progress of the cure, a large catheter should be introduced into the urethra, as a point on which pressure may be made laterally; for I am not aware of any other use it can be, unless the urethra is also

torn, when a moderately large catheter should be kept in it permanently, if it can be borne, to aid in the healing of the surrounding parts, with as little contraction as possible of its canal. When the corpus spongiosum is carried or sloughs away with the urethra, there is usually some injury done at the same time to the corpora cavernosa, and the part becomes contracted, and curved when distended. I have not seen any of these cases since the introduction into practice of the methods which have been recommended by Dieffenbach and others, for the formation of a new urethra, by borrowing from the neighbouring parts; but several that I have seen might certainly have been benefited by such treatment.

CASE 87.—A married soldier, of the 29th regiment, was wounded on the heights of Roliça, in August, 1808, by a small musket-ball, which went through both corpora cavernosa, from side to side. The man suffered very little inconvenience, and the wounds healed very well. He seemed to consider the injury as of no importance to himself, but had some idea there might be a difference of opinion in another party. There

is usually a deficiency of substance at the part, and sometimes an inconvenient curve or twist, such as often takes place when the corpora cavernosa and the corpus spongiosum are ruptured from other causes.

I omitted to state at page 50, before Case 68, when noticing wounds of the gall bladder, that I have seen several cases of wounds of the liver in which the gall-bladder was wounded, but they all proved fatal. In a French cavalry soldier, wounded at Waterloo, by a musket-ball, in the right side of the abdomen, there was a presumption that the gall-bladder was wounded, as well as the liver, from the great discharge of bile which took place from the opening of exit, situated a little to the inside of its usual position. The inflammatory symptoms were not very severe, and it is presumed that adhesions early formed, preventing effusion into the cavity of the abdomen. The patient slowly improved, and, was sent to France, with the wounds discharging, but in tolerable health, and likely to live. This case was treated by Staff-Surgeon Lyons, at Brussels.

LECTURE VI.

Wounds of the pelvis from musket-balls; Of common occurrence, and generally, but not immediately fatal; Fistulous openings connected with the bones, a consequence of these wounds; Paralysis of one or both limbs, or parts thereof, a symptom indicative of the mischief caused by the wound; Complete paralysis occurs when the spinal marrow is injured; The paralysis incomplete, when the nerves only are injured; Balls lodging in the bones of the pelvis should be removed, if it can be done with little comparative danger; Cases of musket-ball wound of the pelvis, the ball lodging; Case of musket-ball wound of the pelvis and spinal column; Baron Percy's case of musket-shot wound, injuring the spine; Mr. Guthrie's case of musket-ball wound of the pelvis, with injury of the spine and bowels; Dr. Blicke's case of musket-shot wound of the pelvis, with division of the external iliac artery; Case of musket-shot wound of the pelvis, with division of the common iliac artery; Consequences of the non-removal of balls, that have lodged in the pelvis; La Motte's case of musket-ball lodged in the pelvis, extracted on the forty-fifth day after the receipt of the wound; The situation of the ball should be ascertained, before deep and long incisions are made for its extraction; Case of fatal cannon-shot wound of the pelvis and spine; Mr. Kennedy's case of extensive injury of the loins and pelvis from a large shot; Dr. Adolphus' case of musket-shot wound of the abdomen, with injury of the spine; Wounds of the bladder, not necessarily fatal; Recovery may take place almost by the efforts of nature alone, when the wound is in a part not covered by peritoneum; Dupuytren's experiments on the injection of fluids into the cavity of the peritoneum from the tunica vaginalis; Small effusions of urine supposed in some cases to be confined in a foyer; Wounds of the bladder where covered by peritoneum, the urine not being effused into the cavity of the abdomen; Consecutive accidents; Employment of the catheter to drain off the urine, and thus prevent its effusion into the abdominal cavity; Treatment of the consecutive inflammation; The inflammatory swelling and separation of the sloughs obstruct the passage of urine through the wounds; Advantages of the permanent use of the catheter; The operation required, when the neck of the bladder, or the prostatic part of the urethra has been divided; Baron Larrey on the treatment of wounds of the bladder; Case of musket-shot wound of the pelvis, with injury of the bladder, followed by the discharge of a piece of jacket from the urethra; Case of musket-shot wound of the pelvis, with injury

of the sciatic nerve and bladder, followed by prostatic abscess; Case of musket-ball wound of the bladder and intestine; Mr. Bruce's case of musket-ball wound of the bladder, followed by urinary fistulae; Mr. Boufflower's case of gun-shot and bayonet wounds of the bladder and intestines; Dr. Waltz's case of pistol-shot wound of the bladder; Fatal case of musket-shot wound through the pelvis, involving the bladder and intestines; Fatal case of musket-shot wound of the pelvis and bladder; Mr. Douglas' case of musket-shot wound of the bladder, followed by the discharge of a piece of cloth from the groin, and another from the right nates; Dr. Gordon's case of musket-shot wound of the bladder, the orifices of entrance and exit becoming fistulous; Baron Percy's case of pistol-shot wound of the bladder, followed by a tumour in the perineum; Case of musket-shot wound of the bladder; Case of musket-shot wound of the bladder and rectum; Serious consequences which occasionally follow musket-shot wounds of the bladder; Fatal case of musket-shot wound of the prostatic part of the urethra, or of the neck of the bladder; The plan of treatment requisite in such cases; Mr. Guthrie's case of musket-ball wound of the bladder, the ball lodging in that viscus, and forming the nucleus of a calculus; afterwards removed by the operation of lithotomy; M. Langenbeck, Baron Larrey, and Mr. Cline's cases of the extraction of a ball from the bladder; Bonnetus' case of passage of a small ball by the urethra; Dr. Hennen's case of musket-ball wound of the bladder, followed by abscess of the thigh; Wounds of the rectum; Cases of musket-shot wound of the pelvis and rectum.

Wounds of the pelvis from musket-balls, injuring its contents, are of common occurrence, and although frequently fatal, they are not usually so at the moment, and often permit of a considerable length of treatment before they destroy the sufferers, or admit of their recovery. In many instances fistulous openings through the bones remain for years; and in a great number the ingenuity of the surgeon is often at work, to discover in what manner important, nay vital parts, have escaped injury. The orifices of entrance and of exit of the ball lead to little information. It is only from the absence of paralysis, or of hemorrhage, or of those signs which indicate the lesion of any of the organs contained within the pelvis, that the surgeon can form an estimate of the evil which has been committed; and even when parts of the

greatest importance are injured, such as the bladder or the rectum, the general symptoms are occasionally of little moment.

Paralysis of one or of both limbs, or of parts of them, which is not uncommon at the moment of injury, indicates the nature of the mischief; in some cases it comes on at a later period of time.

When the paralysis is complete, which it rarely is, unless the spinal marrow is injured in the loins, the functions of the bladder and of the rectum are implicated, and there is little pain. When the nerves only are injured, the paralysis is not complete; it usually affects one side more than the other, is a numbness rather than a paralysis, accompanied by severe pain, sometimes in the seat of injury, but more usually extending to the thigh and to the extremities of the nerves in the foot. I was last year consulted in a case of wound in the last dorsal or upper lumbar vertebra, of several years standing, from a pistol shot, in which the paralysis of both limbs was complete. The patient had a great desire to have the cicatrix opened, and the ball followed and extracted, and would willingly have submitted to such operation, but he could not find any one in London or Paris willing to attempt it.

When a ball appears to cross, or to pass even from side to side of the pelvis, it is not always easy to say whether it has penetrated the cavity or not, until symptoms indicative of such injury appear, and the less done to such wounds the better. When a ball enters, strikes a bone, and lodges, it is very desirable to ascertain its situation, in order that it may be at once removed, if it can possibly be done with little comparative danger; for balls which pass through these flat bones, or lodge in them, may often be removed, and the comfort of the patient assured, by a timely operation, performed by a skilful surgeon, instead of proving the source of much torment and misery for many years, by their being allowed to remain.

CASE 88.—Colonel Wade was wounded at the battle of Albuhera, in 1811, by a musket-ball, in the lower part of the iliac region, on the left side: it passed through the ilium, and was supposed to have narrowly avoided opening into the cavity of the abdomen. It could not be followed beyond the bone, and appeared to have lodged on the outside of it, under the gluteal muscles. The inflammatory symptoms were subdued, and he gradually recovered his health, some pieces of bone having come away from time to time. A small fungous protrusion and discharge continued from the wound for several years, with a certain degree of pain, and of occasional lameness in the leg and thigh. The wound closed of late years, sometimes for a few months, and re-opened after an attack of pain, with great lameness, and swelling of the hip, and a discharge of matter from the original

site. An abscess at last formed under the gluteus maximus, and was opened at its anterior and lower edge. This gave great relief, and prevented the irritation of the upper and anterior original wound, the matter finding a more ready passage. I often assured him I could distinguish the ball very deeply seated, and in the summer of 1846—thirty-five years after the receipt of the injury, it had descended so far that I passed a probe under it, at the distance of two inches and a half from the lower opening. He was to have come up as early as his duties would possibly permit, in the spring of 1847, to have had it removed, when he was suddenly cut off by apoplexy, to the great regret of all who knew him.

CASE 89.—Lieutenant-Colonel, now Lieutenant-General Sir Hercules Pakenham, was wounded, at the assault of Badajos, by a musket-ball, April 6th, 1812, which deprived him of the use of the thumb and little finger, and partially of the hand, and by another which struck him on the right iliac region, passed in just below Poupart's ligament, and outwardly through the ilium. Eight pieces of bone came away at Elvas, and eleven more, in 1813, in London. He went to Baréges in 1814-15-16-17, with the hope that the ball might be loosened, and removed; but in vain, it never could be found. A small quantity of inoffensive glutinous matter, sometimes streaked with blood, is discharged from the seat of the injury: at times the wound is painful and very troublesome, for a week or ten days together; after which it becomes quiet, and during this period little inconvenience is felt in the limb.

CASE 90.—Sir J. M. Wilson, now of Chelsea Hospital, was wounded in seven different places, and by three musket balls, on the left hip, at the Chipewewa, near the falls of Niagara, on the 5th July, 1814. One, which struck him a little before the trochanter, passed upwards and through the ilium, from which several pieces of bone came away on four or five different occasions, and lodged against or in the spinal column, which rendered the left leg quite powerless, and impaired the power of the right. He fell. Shortly after an Indian warrior came up, placed his foot on his neck, drew out his scalping knife, seized his hair, and was in the act of beginning to scalp him, when a stray shot passed through his chest, and laid him prostrate by the side of his proposed victim, who thus happily escaped. The numbness and inability to put the limb to the ground continued from eighteen months to two years, during which time he was on crutches. After this time he gradually recovered, always suffering more or less. The pain in the back is often most excruciating, coming on without any apparent cause, except perhaps change of weather. He limps after walking a couple of miles, and if exercise is continued, pain ensues. He married ten years afterwards, has several children, and is obliged to lead a very regular quiet life, without

which he breaks down. The great suffering he experiences, at the end of thirty-one years, is, however, from the pain in the back, a sense of coldness in the left leg, and numbness, accompanied by pain in the course of the nerves. He is equally sensible to heat in a close atmosphere, which he is obliged to avoid. The alvine, and urinary secretions, &c., have always since the wound, been impaired, or deranged. He is troubled with painful affections, and a train of nervous feelings of the whole system, attributable to the injury received.

CASE 91.—Baron Percy, in his *Chirurgien d'Armée*, seconde partie, p. 234, says: that a young Irish soldier was wounded at the battle of Fontenoy, by a musket ball, which, after breaking the spinous process of the third lumbar vertebra, lodged in the side of its body, causing paralysis of the lower limbs, and of the bladder. M. Giraud dilated the wound upwards and downwards, and removed the splinters of the spinous process. The attempt to remove the ball failed; the wound was dressed simply; he was bled five times, and poultices applied, until an abundant suppuration was established. The ball was then moved, and ultimately extracted by the screw, after which the paralysis gradually disappeared, and the patient recovered.

CASE 92.—A soldier, of the 4th division of Infantry, was wounded at the battle of Salamanca, by a musket-ball, which entered immediately above the right ilium, passed across, and made its exit nearly opposite on the left side, going nearer to the back than to the wall of the abdomen. He was supposed to be killed, but had gradually recovered a little life, when brought to me to the field-hospital some hours afterwards. The belly was swelled, generally tympanitic, and some hemorrhage had taken place from the wound of entrance, the leg of which side he was unable to move. On reaction taking place, he was bled repeatedly, and treated antiphlogistically, with the aid of calomel, opium, and antimony. On his removal to the San Domingo Hospital, enemata were administered, and on the sixth day the bowels were relieved naturally. A small quantity of fecal matter was passed for several days with the discharge from the wound, but this gradually ceased, and the man ultimately recovered without any particular defect except weakness, and occasional pain and derangement of bowels, on any irregularity.

The following is the most serious injury of the pelvis I have known, not causing immediate death.

CASE 93.—John Bryan, 1st light battalion of the King's German Legion, was wounded on the 17th June, near Quatre-bras, by a musket-ball, which entered at the groin, and made its exit behind, at the back. Transported to Brussels, he was seen for the first time on the 22d by the Staff-Surgeon, who found the foot and leg in a state of mortification. The countenance had a

cadaverous appearance; pulse small and weak; some nausea and retching. Wine, and other stimulants were freely given, and he rallied a little on the 23rd and 24th. On the 25th, the stomach rejected everything, except brandy and opium. On the 26th, a line of separation seemed to be about to form between the dead and the living parts, although he was evidently failing; he died on the 28th, eleven days after the receipt of the injury. On examination after death, the ball was found to have completely divided the external iliac artery; about a pint of coagulated blood, mixed with some excessively fetid pus, was collected in the pelvis; both ends of the artery had receded considerably from each other, and a coagulum had formed in each, which was easily squeezed out, the orifice of the upper end only being a little contracted. There were signs of some peritoneal inflammation having taken place; the intestines had not been wounded, and the ball, in passing out, had splintered the upper edge of the back part of the ilium.

THOS. Blicke, Staff-Surgeon.

General Sir Edward Pakenham was killed on the spot, at New Orleans, by hemorrhage, from a nearly similar wound, in which the common iliac artery was divided.

I have removed balls on different occasions which have lodged in the bones of the pelvis, and always with the greatest advantage, when done early. I have seen much evil result from their being allowed to remain, causing not only frequent distress, but at last giving rise to disease in the bone, derangement of the general health, and death. When the ball can be felt impacted in the bone, incisions through muscular parts of little consequence, should not be spared, to expose it. If an error exists at this moment, it is that too little is done, rather than too much. Too great reliance is placed on the efforts of nature, and not enough on the resources of art. The constant meddling with a wound is not recommended; nevertheless, much may be done by careful investigation from time to time, of which La Motte gives a good example in his fifty-first observation.

CASE 94.—A grenadier was wounded at the battle of Dettingen, in 1743, by a musket-ball, which entered above Poupert's ligament, near the opening of the external oblique muscle on the left side, and lodged. Thirteen days after his reception into the hospital at Landau, Lamotte felt with the probe what he thought was the ball lying on the outside of the psoas muscle against the bone. He made the patient lie on his face, and touched the foreign body every day, in order to loosen it. On the thirty-fifth day he was satisfied it was the ball, and on the forty-fifth, after many attempts, it was at last extracted. His fifty-second observation relates to a case as nearly similar as possible to those of Sir H. Pakenham and Colonel Wade. He

made several deep and long incisions in search of the ball, which he could not find; the wound became fistulous, and at the end of a year closed, in all probability to re-open from time to time.

The difference in practice between 1743 and 1847 ought to be, that in 1847 the ball should be found first, and the deep and long incisions made afterwards for its extraction, which does not of course exclude any previous external openings that may be necessary to facilitate the first examination.

CASE 95.—An officer of Engineers, was struck by a cannon shot, on the last days of the siege of Ciudad Rodrigo, on the left hip, which fractured the ilium, carried away a portion of it, and of all the muscles attached to its upper, outer, and back part, from the anterior superior spine to the lumbar vertebra, which were exposed, and the spinous processes fractured. The peritoneum was separated from the inside of the wall of the pelvis, without being opened into, and momentary hopes were entertained of the possibility of recovery. He never however rallied after the blow, with all the care I could give him, but always suffered great pain, and died on the third day. In other very severe cases of somewhat similar nature, inflammation was not induced in the cavity of the belly, and I have known persons recover, beyond even the most sanguine expectations.

CASE 96.—John Breach, 41st Regiment, aged twenty-two, was wounded across the loins, on the 10th Sept. 1813, on Lake Erie, N.A., by a large shot, which struck him in a slanting direction, from above downwards, commencing at the upper part of the left loin, and proceeding towards the right hip. In its course it carried away the greater portion of the lumbar muscles of the left side, broke three of the spinous processes of the vertebra, divided the lumbar muscles of the right side, shattered the upper part of the body of the ilium, and tore up, and turned back, the gluteus maximus and medius muscles, leaving the minimus nearly bare.

The exposed surface of this wound, immediately after the accident, measured fifteen inches long, by eight wide. The posterior spine of the ilium was broken in pieces, the fragments of which were driven in among the muscles, and several splinters extended into the body of the bone, some of which were loose, and others fixed.

Nothing could be done at night, but early in the morning, Assistant Surgeon Kennedy removed all the loose pieces of bone which were driven among the muscles, and brought up all the edges of the wound into as small a circle as possible, with straps of sticking-plaster, on the fractured portion of the bone, which remained uncovered, and laid a double fold of linen covered with tow, over the exposed part.

The inflammatory action was considerable for the first three days, with a corresponding degree

of fever; an enema was given, with a dose of salts. On the third morning, in dressing the wound, it was reduced to ten inches by six; everything seemed to be going on well for a fortnight, when he was attacked, all at once, with shiverings, night-sweats, and all the concomitants of internal suppuration. This poor fellow, being obliged to lie on his belly, or on his hands and knees, and the suppuration having become profuse, his position favoured the insinuation of matter through the crevices of the fissures, and formed sinuses around the pelvis. It being impossible to change his position, the collections of matter increased, and caused great derangement of constitution. For ten days he was in the greatest agony, and particularly during nights sent forth the most pitiable groans, from sheer excess of pain. An opiate at night was his great consolation, a little biscuit, soaked in Indian-corn coffee, was his only food, common imperial his drink, and his bed, his share of an old sail on the berth-deck; notwithstanding which hard fare, this poor fellow, when at all free from pain, was in good spirits, and always hoped he should recover. The tenth day after this attack, the symptoms diminished in intensity. On the twelfth he complained of pain at the bottom of his belly, on the right side. On examining the part, a little elevation was found above Poupart's ligament, just on the outside of the abdominal ring, on pressing which suddenly, a jerk of matter proceeded from a crevice in one of the fissures of the fractured portions of the ilium, shewing at once its cause and the course of the abscess. This tumour was opened with an abscess lancet, and nearly two pints of pus were evacuated, which gave instantaneous relief; the opening was kept patent by a plug of lint. The broken pieces of bone, now getting loose, were in turns detached, and several pieces were removed; but there was a large piece which extended into the body of the bone, the removal of which would be more difficult, and the cause of greater danger, from the extent to which, on its being detached, the pelvis would be exposed. As the wound was still going on well, and as the pump below, (as the patient termed the opening in front,) was still kept going, this piece was not forcibly detached; nevertheless its removal was aided by gentle efforts, and by encouraging the granulations gradually to raise it from its place.

Notwithstanding the great discharge, he improved rapidly, and on his being moved to a very comfortable hospital establishment, at Presq' Isle, an opportunity was afforded of assisting nature, to renovate his system, and accomplish his cure. It was nearly four months before the remaining large piece of bone could be removed, and it then left a thimble-like cavity into the pelvis; this, however, was soon filled up by healthy granulations. The formation of new skin was, nevertheless a very dilatory process; during the last three months only a few inches having been

gained; the wound, when he left the hospital at Presq' Isle to be sent home, measuring six or seven inches by three or four. The granulations, however, had covered the whole surface, except two black spots where the broken vertebrae projected, and were exfoliating. Previously to his leaving the hospital, he could move about with the assistance of crutches, and could turn himself on either side in bed, which he had not been able to do before. On his arrival in England, two years after the receipt of the injury, this wound had not quite healed, and he was admitted into the general hospital, Isle of Wight, where he remained until it was completely skinned over. On his arrival in London, in January, he walked from the Strand barracks to the Tower, to call on his faithful attendant, Assistant Surgeon Kennedy. The wound was then quite healed; the cicatrix however was deep, and as large as the hand of a good-sized man, at which time I first saw him.

CASE 97.—Captain Campbell was wounded, by a pistol-ball, on the 5th of September, 1805, which penetrated the abdomen on the middle of the right side, and was extracted from nearly the same situation on the left, and which from its irregular denticulated shape, would appear to have impinged against a vertebra. He complained of violent pain in the loins and belly, with numbness and pain of the left leg and thigh, and suffered also from the greatest oppression, anxiety, and sickness. An enema was administered, a mild laxative mixture was desired to be given occasionally, as the stomach would retain it, and twenty-four ounces of blood were taken from the arm. At nine at night, a quantity of hardened feces was passed; pain excruciating, and some difficulty of breathing; lower extremities nearly paralysed; anxiety and oppression great. Venæsectio ad $\frac{1}{2}$ x. Cannot pass his water; hot fomentations; enema and medicine repeated, and at 12 at night sixteen ounces of blood were drawn. At 3 P.M. had three motions, the two last containing apparently a pint of pure blood. Pain and other symptoms being as urgent, eight ounces more blood were taken away. At 6, P.M. made water for the first time highly tinged with blood; has had two motions, also mixed with blood. Pain continuing, ten ounces of blood were abstracted although occasionally almost fainting on any movement; belly fomented. At 8 at night, sixty drops of laudanum. At 10, being very restless, twenty drops more, which procured some sleep although he vomited frequently; belly relieved by the fomentation; three stools mixed with blood.

September 6th. All the symptoms relieved; passes blood with his urine; sickness and vomiting troublesome; pulse 90, rather firm than feeble. 1 o'clock; complains of violent pain in left leg and thigh, belly, and loins, pulse 116, full and strong. Venæsectio ad $\frac{3}{4}$ xvj. Barley water with nitre for common drink. 6 P.M. Pulse 96; bowels open, with

blood; symptoms generally relieved. Tinct. Opii. gtt. xii at night.

Sept. 8th: Slept better; less pain; paralysis continues. In the evening symptoms aggravated; lost twelve ounces of blood; enema, &c., repeated; pulse 120.

9, 10, 11, 12. Pulse 96; bowels open; urine bloody; is generally better.

15. Wound of exit healed; urine bloody; bowels open. Chicken broth for the first time.

20. The opening of entrance being nearly closed was enlarged, and a free exit allowed for the matter.

October 20. Wounds quite closed; is free from pain, is able to move about the house on crutches; warm stimulating applications to the limbs seem to have given most relief.

November 20. Paralytic affection gone; he can now mount his horse, and has only a feeling of numbness and torpor in the left leg and thigh.

He lost in four days ninety-six ounces of blood.

JACOB J. ADOLPHUS, Surgeon, 60th Regt.

The general opinion which formerly prevailed, that *wounds of the bladder* by musket-balls, were for the most part mortal, is now known to be erroneous. When the bladder is wounded below, or where it is not covered by the peritoneum, persons often recover by what may be considered the almost unaided efforts of nature. Dr. Thomson, in his report of the wounded in the hospitals of Brussels, after Waterloo, says he saw fourteen cases recovering in which the bladder had been penetrated by musket-balls. A larger number came under my observation there, and at Antwerp, and many had already died. I have never seen a single person recover in whom the urine had found its way into the general cavity of the abdomen. They generally die of inflammation, in from three to six days; and much depends on the nature of the treatment in most of the instances which are curable.

Dupuytren shewed by direct experiments, that injecting bile, urine, or other fluids into the cavity of the peritoneum from the tunica vaginalis, which in animals always communicates with it, gave rise to severe inflammation, although the fluid injected might even be absorbed, so as to leave no trace behind. Some late cases of rupture of the bladder from blows, have led to the supposition that the effused urine, if small in quantity, may be confined in a pouch or *foyer*, as blood is said to be in some few cases, after a wound, and that in this way life may be saved. If such a thing should occur, it will only be one more added to the number of miraculous cases which occasionally take place, contrary to all ordinary experience.*

* The late Mr. Cline amused himself, at the middle period of life, by farming in Essex, and the breeding of horses. Disgusted by the unsurgical mode adopted, of castrating the colts by the clamp, he had them cut secundum artem, and they all died from inflammation of the belly. The late Mr. Coleman made him acquainted

When the bladder is wounded where it is covered by the peritoneum, and the opening, or openings, do not by some accident, permit the urine to flow into the cavity of the abdomen, the patient may be free from immediate danger for a short time, although very anxious and alarmed greatly depressed in countenance and manner, and even sick to vomiting. The pain is not commonly severe at first, and if he can make water, which in all such cases it is desirable to prevent, it is more or less coloured or mixed with blood. If the urine should not escape into the cavity of the abdomen, the ordinary inflammation which must necessarily ensue, takes place, and affects the internal surface of the bladder. The desire to pass urine becomes greater, and is frequently insupportable, whilst it can in some cases be only passed by drops. In others these symptoms are less urgent. Nevertheless, the natural action of the bladder, or, in those severe cases, the additional efforts which are made for its expulsion by the abdominal muscles, cause the urine to be forced through the wound, and thus to be effused. This takes place more or less in every instance, and when it is forced in this way into the cavity of the abdomen, it proves fatal; whence the advantage to be obtained from the early use of the elastic catheter. When the orifices of entrance and of exit are free, and low down in the pelvis, the urine may run out without much immediate mischief ensuing. But as this cannot always be known, an elastic gum catheter should from the first be introduced, and fixed by the usual means in the bladder, in every case in which the nature of the injury is doubtful, until the urine ceases to flow through the wounds. It must, however, be recollected, that in some cases in which it has caused great irritation, by being introduced too early, and whilst the bladder was very sensitive the patients have been much relieved by its removal. The principle is nevertheless incontrovertible in all doubtful cases; and the urine should be allowed to drop out of the catheter nearly as fast as it passes into the bladder, when this organ is very irritable; great pains should also be taken that the end of the instrument should be within, but not too far within the bladder, so as to excite irritation by rubbing against its sides, or to allow of its end rising above the urine which might in this way collect below it, and at last escape through the wounds.

The next point requiring attention is to restrain the inflammatory actions which ought necessarily to follow, within their proper limits. This is to be done by general bleeding, the application of leeches, the administration of diluent drinks in moderate quantity, the exhibition of gentle aperients, such as the oleum ricini, and by enemata. Opium in all these cases is an impor-

tant remedy, principally in the shape of morphia; and I prefer the muriate or the bimeconate, when given by the mouth. Opium in substance, when introduced into the rectum in the shape of a suppository, or dissolved in half an ounce, or an ounce of water, as an enema, should be given and repeated per anum, in such quantities beginning with two grains, as will procure ease.

The urine in most cases of injury below the peritoneum, flows readily through the wound of entrance, if not of exit, in the first instance, and care should be taken, by enlarging the posterior one, that no obstacle within reach shall prevent it; but after inflammation has been established, the parts swell, and as the slough begins to separate, its passage is often obstructed; when the catheter, if not used before, will render important service, by allowing the sloughs to be discharged, without the healthy parts being irritated by the urine being retained. After a time, the urine may be drawn off in small quantities through the catheter, as frequently as circumstances may render advisable. The permanent use of the catheter in these cases will often prevent the urine from forming any devious paths as it proceeds outwards, ending in abscesses and fistulous openings, causing much discomfort, and even misery. It is not common for blood to be poured into the bladder in such quantity as to cause much inconvenience; if it should be otherwise, and it coagulates, a silver catheter should be used, by which it may be separated into parts, and rendered more easy of solution by injections of warm water. When the neck of the bladder, or the prostatic part of the urethra is divided, so that a catheter cannot be efficiently used, surgery must come with more immediate aid to the assistance of the sufferer, by making a clear and free opening from the perineum, for the evacuation of the urine, and of the discharge from the wound. If a ball lodges in, or near the bladder, or in the prostate, it must be removed by the operation as for stone.

Barron Larrey in the second volume of his *Memoirs and Campaigns*, page 165, says "that little urine escapes by the wounds during the first twenty-four hours when the bladder is wounded, in consequence of the tumefaction which takes place in the lips of the wound. When the bladder is full, it flows out at the instant it is wounded, and only by the opening of the exit of the ball. Infiltration is prevented by the thick slough, which fills the track of the wound, and it is only when these sloughs separate that infiltration takes place. It is then of the greatest importance that an elastic gum catheter, as large as the canal of the urethra, should be fixed in the bladder when the slough begins to separate, in order that the urine may be freely evacuated, instead of being detained in the track of the wound." The orifice of entrance has as often allowed the urine to escape, in the cases I have seen, as that of exit; and the directions that follow, in the fourth volume, are not

with the fact, that the passage of communication of the tunica vaginalis with the cavity of the peritoneum, did not become obliterated in animals, as in man.

quite consistent with the theory which precedes them in the second; they are in page 165. After having enlarged the external wound, a gum elastic catheter is to be fixed in the bladder; it should be changed every two or three days, &c. &c. And he adds, that General Bon died because he would not allow a catheter to be passed, nor his wounds to be dilated. In his *Memoir on Wounds of the Bladder*, in the fourth volume, he defers the introduction of the catheter until the sloughs are about to separate. "During the first three or four days, which is the period of inflammation, no examinations, nor soundings of the bladder, should take place. It is at the moment when the sloughs separate that the catheter should be fixed in the bladder;" nevertheless, in one of three cases he relates, and one in which the bladder was not opened, but only injured, he fixed a catheter in the bladder from the first. I am of opinion that it is safer to fix it in the bladder in every case the least doubtful from the first, if it can be retained with ease; and that it should not be removed unless to be cleaned, or when distressing to the patient, until it can be entirely dispensed with.

CASE 98.—A soldier of the light division, wounded on the heights of Vera, in the Pyrenees, was sent to me at Santander, with eight hundred other wounded, in September, 1813. A musket-ball had entered behind near the sacrum, and had lodged. He was bled twice, in consequence of suffering pain in the part, but was not otherwise much disturbed. There was at first a difficulty in making water, but this gradually subsided; although he always suffered pain in micturition, which was frequent and distressing. He remained in this state until December, when he passed with considerable effort, and after much difficulty, a hard piece of his jacket about half an inch in length, and larger than the orifice of the urethra through which it was forced. As it was not encased by calcareous matter, it could not have been long in the bladder, but must have been lodged near it before it ulcerated its way in, giving rise to the constant desire and irritation which he had so long experienced. His symptoms then subsided, although they had not entirely disappeared, when he left me for England.

CASE 99.—A French soldier was wounded by a musket-ball, on the back part of the right hip, at Almaraz, on the Tagus, taken prisoner, and sent to Lisbon, when I saw him in the autumn of 1813. The ball had lodged somewhere, but gave him little inconvenience at the time, beyond some pain in the course of the sciatic nerve, subsequently followed by defect of motion on the right side. Four months after the injury, pain came on about the region of the bladder, with great desire to make water; which he could not do when standing, but which dribbled away when lying down. When quiet he suffered little, but great pain followed any attempt at continued motion. A catheter could be introduced, but with great difficulty when it reached the prostate

gland, which was exceedingly tender to the touch. After a time, the catheter could not be passed, and the man was in great agony, until something appeared to give way, and a discharge of matter took place, when the urine followed, and he was relieved. An abscess had formed in all probability, from the proximity of the ball, which still could not be felt. The man recovered, retaining, however, his former state of lameness and defect of power, although relieved from the vexatious irritation of his bladder.

CASE 100.—A soldier, of the 4th division of infantry, was wounded at the battle of Toulouse, whilst entering a redoubt, by a musket-ball, which entered at the left groin, and crossing the pelvis, came out on the upper part of the opposite hip behind. The urine flowed from both wounds, and from the rectum, indicating that the ball had passed between these parts, and a little feces came from the posterior wound for three weeks. The pain and suffering were not great, and principally arose from retention of urine, requiring the use of the catheter, which was left in, and changed from time to time, until the urine flowed by the side of it, instead of through the wounds, which it did occasionally for some weeks in drops, but not in any quantity; after which the wounds gradually closed, and the man was sent to England cured.

CASE 101.—Jean Sordis, a French prisoner, was wounded, at the battle of Waterloo, by a ball which entered about an inch and a half from the root of the penis, and immediately above Poupert's ligament on the right side, passed through the bladder, and made its exit near the tuberosity of the ischium of the left side. He was sent to Antwerp, and was placed under the care of the civil surgeons, who were in charge of the French hospitals at the Corderie, until the 14th of August, when the wounded were given over to the British. Very little had been done for him surgically, and when he came under my care, the original wound was still open, as well as a fistulous opening, which had formed and gave exit to the urine in the left groin; his health had suffered considerably. An elastic gum catheter was introduced into the bladder the following day, and retained, being removed occasionally; the neighbouring parts, scrotum, &c. were defended from the acrimony of the urine, which had previously caused considerable excoriation, and a light diet was ordered him.

August 28.—At present the fistulous opening is healed, the original wound is doing well, and the quantity of urine that escapes through it is inconsiderable; his health has much improved, and I am of opinion, if no unforeseen accident occurs, this man will do well.

SAMUEL B. BRUCE, *Surgeon to the Forces.*

Antwerp, August 28th, 1815.

CASE 102.—James Thompson, 1st. battalion, 5th regiment, on the 10th November, 1813, whilst on

a skirmishing party, in the south of France, received a gun-shot wound in the lower part of the abdomen. The ball entered about half an inch above Poupart's ligament, on the right side, and about midway between the symphysis of the pubes, and the anterior superior spinous process of the ilium: it took a direction across the pelvis, and made its exit a little above the tuberosity of the ischium on the left side. He also received a bayonet wound about a quarter of an inch lower than the entrance of the ball; says, that immediately after the infliction of the wounds, feces, urine, and flatus, were discharged from them, and continued to be voided solely by that way for six weeks; after which time to the present, they have passed partly from the wounds, and partly by the natural course; says, that during the last two months, the quantity voided from the wounds is much decreased; wound made by the exit of the ball healed about two months after its infliction; no urine or feces were ever passed by this aperture. The anterior wounds are much contracted in size at present, but discharge a quantity of purulent matter, and, occasionally feces; general health good; says, that during the whole period of his illness, no bad symptom has occurred, nor has any particular surgical treatment been found necessary. The urine is now, one year after the accident, discharged naturally; the bowels are confined, requiring frequently mild aperient medicines.

C. BOUTFLOWER, *Surgeon to the Forces.*

CASE 103.—A soldier of the Cavalry of the King's German Legion, was struck, at the battle of Salamanca, by a musket ball, which entered just above the pubes, a little to the right side, and came out below on the opposite nates. The urine flowed readily through both wounds for the first three days, when I saw him for the first time, suffering from great pain and distress about the region of the bladder, from which he could not expel any water, neither would it pass by either wound. I immediately introduced a catheter, drew off a moderate quantity of urine, and then fixed it in the bladder, desiring him to let water every hour when awake. This he did, leaving the stopper often out at night. The urine flowed after a few days through the posterior wound, and then ceased. The catheter being washed from time to time, was at last withdrawn as the urine began to flow by the side of it, and the wound had finally closed when he left San Domingo Hospital.

CASE 104.—Captain M. received a wound from a musket ball, at the siege of Ciudad Rodrigo, which entered just above the pubes, passed through the bladder and rectum, and came out behind, splintering the sacrum, the contents of both viscera being freely discharged through this opening. As he suffered but little inconvenience from his urine, very little of which passed by the urethra, this passage was not, in the

first instance, interfered with. Inflammatory symptoms were kept in due bounds, the rectum was carefully washed out by emollient enemata, and his food rendered as light as possible. Under this treatment he gradually improved; the anterior wound first healed, and subsequently the posterior one, leaving him comparatively well, when he left me for Lisbon on his way to England.

These cases give, however, a brighter view of the nature of these wounds than they frequently justify; extravasation of urine, inflammation, and death, are not of infrequent occurrence; and if this should not occur in the early stages, great misery is often caused, from the irritation of the bladder and the discharge which follows, until the constitution is undermined, and death ensues.

CASE 105.—Dr. Waltz, in Graefe and Walther's Journal, refers to a wound from a pistol-ball, which passed through the os pubis and bladder, and made its exit behind, about an inch and a half from the anus. Great depression and alarm followed the injury, a catheter was early introduced, and left in the bladder; the tenesmus was considerable, and was relieved by enemata, and opiates; pieces of bone passed by the urethra, and behind. The patient gradually recovered, the wounds which had cicatrized, re-opening several times until he was ultimately cured, eight months after the receipt of the injury.

CASE 106.—A French officer was struck at the battle of Salamanca, by a musket-ball, which passed through the sacrum, and made its exit just above the pubes. Urine passed through both wounds, and a small quantity of feces through the opening behind. He died at the hospital under my care, on the field of battle, on the third day, from severe peritoneal inflammation, in spite of the most vigorous treatment.

CASE 107.—Daniel Cliff of the 45th Regiment, was wounded, on the 6th of April, at the battle of Toulouse, by a musket-ball, which entered the lower part of the right side of the belly above Poupart's ligament, passed obliquely across the pelvis, and made its exit at the left nates. Blood and urine came through the anterior wound. The belly swelled, with pain at the lower part, which was increased by a desire to make water, although, none could be made. He was largely bled the next day, and a catheter was passed from time to time. On the 8th, urine passed freely by the anterior wound, but none by the posterior, or by the urethra; belly tense and painful; bled again largely, which was repeated on the 10th, when he was taken into hospital; the catheter was then left in the bladder, and the inflammatory symptoms steadily treated; but in vain, as he died on the 14th, eight days after the receipt of the injury.

CASE 108.—Capt. Sleigh, of the 100th regiment, was wounded at the battle of Chippewa, on the 5th of July, 1814, by a musket-ball, which en-

tered the left groin, immediately over Poupart's ligament, by the side of the spermatic vessels, injuring in its course the anterior brim of the pelvis. It thence passed through the bladder obliquely across the pelvis, and terminated its course beneath the integuments in the right buttock, whence it was immediately extracted. Blood and urine flowed incessantly from his groin, and the quantity of the former he lost was considerable. He complained much of pain in the hypogastric region; the abdomen was tense and painful to the touch, and he had an almost continued inclination to micturate; but his attempts, after the most painful efforts, were entirely frustrated. The anxiety was great, the respiration hurried, and the pulse quick and fluttering. He was bled to the extent of thirty ounces; an enema was given; fomentations applied to the belly; and the catheter introduced; all which afforded him some relief. The next day he was removed to the rear, a distance of seventeen miles, in an open waggon, partly during the inclemency of the night, and was quite worn out by so long a journey. He was carried thence on board ship, and landed at York, on the morning of the 9th of July, the fourth day after he received his wound.

July 9, vespere.—Pulse quick; respiration hurried; anxiety great; restlessness; features pale and shrunk; abdomen tense and painful to the touch; severe pain in the perinæum; great inclination to void his urine, and attempts fruitless; wound in the groin sloughy, discharges urine and blood, mixed with a small quantity of pus; posterior wound healthy, no discharge of urine from it; bowels confined; catheter attempted to be passed without success. *R. Olei Ricini, ʒ iss. statim.*

Warm fomentations to be frequently applied to the belly.

10.—Passed a restless night; had two copious stools; voided a few drops of urine by the urethra; has still great inclination to make water; abdomen tense and painful; wound of groin sloughy; discharge very fetid.

R. Ext. Opii. gr. ij. fiat pilula.

Vespere.—Symptoms since morning all aggravated; has considerable thirst; pulse quick; and skin hot.

R. Subm. Hydrarg. gr. iv.

Pulveris Jacobi gr. ij. fiat pilula.

11.—Passed a good night; all his painful sensations much relieved; pulse slower; skin moist; anxiety abated; abdomen less tense; wound of groin still sloughy, and discharge fetid; a small piece of bone extracted from the urethra about an inch in length, and of the thickness of a crow-quill; a little urine followed more freely.

Pilula opii horâ somni sumenda.

15.—Complains of severe pain in the spermatic cord; discharge from groin more offensive; wound filled with large maggots; bowels open.

19.—Wound of groin looks clean; a small piece of bone discharged by the urethra, and a piece of cloth extracted from the groin.

22.—Discharge of urine by the urethra becoming more copious; wound of groin contracting.

24.—A small piece of bone extracted from the groin.

29.—Posterior wound almost closed; discharge from groin less fetid.

August 5.—Passes a good deal of pus and urine by the urethra.

13.—Was attacked with ague yesterday; paroxysms slight.

15.—Ague returned yesterday, ter in die; paroxysms milder. *Decoctum et pulv. cinchonæ.*

17.—Has had no return of ague. *Repet: cinchona.*

29.—Posterior wound much inflamed, and very painful upon pressure. A poultice to be frequently applied.

30.—Inflammation more extended; pain more severe; great hardness upon pressure.

Sept. 1.—Abscess has burst; a piece of cloth has been extracted; urine and pus are discharged by both wounds.

2.—Discharge of urine and matter very copious.

6.—Had an attack of ague yesterday; paroxysms severe.

R. Solutionis arsenicalis m. v.

Tinctura opii m. x.

Mistura camphoræ ʒ iss.

M. ft. haust. ter in die sumend.

9.—Had an attack of fever yesterday; paroxysms severe.—*Pergat.*

12.—Doing well; wounds closing. Medicine omitted.

16.—Bladder resuming its power; discharge of matter from groin very trivial.

Oct. 4.—Wound of groin nearly closed.

18.—Posterior wound closed.

30.—Wound of groin closed; urine passed by the natural passage, mixed with pus.

Nov. 12.—Has had a return of ague; embarked on board ship for Kingston, a change of air being recommended.

The copious bleeding on the evening he received the injury, was the means of preventing the impending inflammation, so much dreaded. It was very surprising to see a longitudinal piece of bone finding its way into, and along, a passage so narrow as the urethra.

At first, I supposed that only the fundus of the bladder was wounded; but when the collection of matter took place in the right buttock, and a piece of cloth was extracted, the urine following, I was satisfied that both sides of the bladder had been transfixed by the ball; and that, probably, the urine from the commencement had been prevented from flowing posteriorly, by the intervention of this foreign body. An elastic gum catheter could not be passed into the bladder on account of the piece of bone which

had forced its way into the urethra, and from its being obstructed afterwards by smaller pieces of bone. Captain Sleigh had several attacks of ague after he recovered; during one of which, ten months afterwards, the groin became painful and inflamed; and the parts giving way, the urine was again discharged by the wound. About six weeks afterwards, it again closed, and has remained so ever since, but his urine is always mixed with a considerable quantity of pus. The left leg is weak and limited in its motion, and he complains of much debility about the small of the back, and will not, in all probability, be able to undergo the hardships and fatigues of a military life.—*L. Douglas, 8th Regiment.*

When I saw this gentleman some time afterwards, it appeared to me that the purulent discharge from the urethra was not from the inner membrane of the bladder, but was caused by the dead bone of the pelvis having a communication with the bladder by a fistulous opening.—*G.*

CASE 109.—*A. Labiche, 7th French Dragoons,* was wounded by a musket ball, at Waterloo, which entered the left hypochondrium, near the anterior extremity of the twelfth rib, and made its exit near the spinous process of the second lumbar vertebra. Passed some blood with his urine at first, and by the posterior wound some feces and pus. On the 14th of July, he passed air through the urethra, judging from the gurgling noise it made. On the 20th, urine passed by the posterior wound, and air by the penis, as shown by immersing it in water, both of which ceased the beginning of August. After a few days they returned with a greater discharge from the wounds, which became fistulous, and in this state he was sent to France.—*Theodore Gordon, M.D., Staff-Surgeon.*

CASE 110.—*A soldier, of the King's German Legion,* was struck, at Waterloo, by a musket-ball, which entered a little way above the pubes, and lodged. The symptoms which immediately followed were by no means severe, although he had passed a little bloody urine at first; and the external wound closed without difficulty. He complained of pain at the neck of the bladder, and a great desire to make water, with other signs of stone in the bladder, which induced me to pass a sound, when I found that the ball was lying loose in the bladder. Staff-Surgeon Campbell, under whose care he was, at once acceded to my request to send him to the York Hospital, at Chelsea, being another instance, I am glad to mention, of the attention and kindness with which I was treated, on all occasions, at Brussels by the medical officers of that army. On his arrival at the York Hospital, he became, with the French soldier whose thigh I had amputated at the hip-joint, an object of great attention. I performed the operation for the removal of the ball

in the presence of a large concourse of military and medical persons. It was done in less than two minutes; but the calculus, composed of the triple phosphates which had been formed around it, as Dr. Marcet afterwards ascertained, yielded, and broke under the forceps. The pieces were removed separately. The ball being heavy fell below the neck of the bladder, which, being healthy, yielded to the pressure, and allowed it to sink on the rectum; and I could not bring the end of the forceps low enough to grasp it. In this dilemma, I introduced a finger into the rectum, raised it up, and caught it at once, to the great satisfaction of all present. The bladder was then well washed out, so as to remove all the pieces that might remain, and the man was removed to bed. He was bled once, in consequence of some apprehension of pain; but he had not a bad symptom, and rapidly recovered.

The symptoms of irritation did not entirely pass away, as I could have wished, and I began to fear that some small piece of calculus had been overlooked; when one morning, after considerable efforts, he passed a ring of calcareous matter, which had formed around the orifice of the bladder, and which being dislodged, had fortunately entered the urethra, along which it was forced by the urine. It was evidently formed of the phosphates in sand, which had become agglutinated together, around the meatus of the bladder. This he took with him to Hanover, where it and he, and his double wound, attracted great notice. The ball, which was flattened on one side, I kept in a small box, together with the pieces of calculus which were extracted, and shewed them annually at my lecture on this subject for many years. One evening, however, I unfortunately left my little box on the table after lecture; and when I recollected, and returned for it, I found that some gentleman had borrowed it.

Balls have been stated to have been lodged in the bladder by several of the older authors, as Bartholin, Seger, Hildanus, Duverger, Binninger, Covillard, Burgowen, Garengot, Petit, and Morand, and by Percy, Cline, Crampton, and others, among the moderns.

Baron Larrey laid before the Royal Academy of Medicine of Paris the history of two cases somewhat similar. In the first case, the ball entered the pelvis through the sacrum, traversed the rectum, and dropped into the bladder, blood and urine passing by the rectum. As the man recovered, he thought he felt something roll in the bladder. At the end of a month the external wound was closed, and in two weeks afterwards the urine ceased to flow through the rectum. Ten years afterwards, still suffering from derangement of the function of the bladder, a hard substance was found on examination with the finger, in the situation of the prostate, but to one side. This was considered to be the ball, and the cause of all his distress. Langenbeck removed it by the lateral

operation for the stone, and the man, after some suffering and difficulties, perfectly recovered.

In the second case, M. Guernon, Lieutenant of the 92nd of the line, was wounded by a musket-ball, in the inner and upper part of the right groin, through which wound purulent matter and urine passed. He suffered much from pain in the region of the bladder, and from a constant desire to make water, which came in small jets, mixed with blood. An examination of the bladder with the sound gave an obscure sensation of a foreign body in that organ. The operation for the removal of a stone having been performed by the Baron, he extracted a small ball, without difficulty, on the fifth day after the injury. On the seventh after the operation, the urine passed by the urethra; and on the twenty-first, he left the hospital cured, to join his regiment.

Mr. South has recorded in his translation of Chelius a case somewhat similar to those related, in which a piece of the man's clothing, rolled up, of the size of a goose quill, and about two inches long, came through the urethra, at the end of a few days after the receipt of the injury, in July, 1811. In February, 1812, Mr. Cline performed the operation for stone, and removed a ball which was found to be encysted on the left side of the bladder, much flattened, and having a small portion of bone adhering to it. Similar operations have been done by others. The only case I am acquainted with of a ball having been passed by the urethra is related by Bonnetus; but then it was not larger than a good sized pea.

Pieces of cloth and of bone have been frequently discharged through the urethra, as well as air and collections of matter which have been occasioned by the irritation of some foreign body.

Dr. Hennen relates the case of a light infantry soldier which he brought under my notice at Brussels, the man having been wounded by a musket-ball, which entered close to the pubes and came out through the nates of the same side near the sacrum. The urine passed entirely by the anterior wound, and none by the urethra. He was treated antiphlogistically, and partly, but not regularly by the catheter. An abscess formed in the thigh, perhaps in consequence, from which several small pieces of bone and urine were discharged for several months, and some sand by the urethra. I have seen two cases, one of an officer, nearly similar, who recovered, the particulars of which I have mislaid.

CASE 111.—The following from Baron Percy, is in point:—A young man was wounded by a pistol shot, which entered just above the os pubis, through the linea alba, wounded the bladder, and lodged. The belly swelled; a tumour formed in the perineum; no urine passed; the bowels were confined, and fever ran high, with a tendency to delirium. Believing that the tumour in the perineum, and the fluctuation he thought he perceived, might be caused by extravasated

urine, he punctured it with a trocar, and evacuated a large quantity of bloody urine. This induced him to enlarge the opening, and carry it on to the bladder, through which he brought out the ball, some shirt, and several clots of blood. The man was bled nine times in all; the urine after a time passed in the ordinary way, and the patient slowly recovered.

The rectum may be wounded without any other organ being injured within the pelvis, of which I have seen several instances. An officer of the Navy was struck by a rifle-ball towards the lower part of one side of the sacrum, after being knocked down by one he had received on the head, and by another in the neck and back. The ball which passed into the rectum, made its exit on the opposite side of the sacrum, and stercoraceous matters were evacuated by both. The pain was severe; the limbs were deprived of much of the power of motion, and the next day, the bladder was incapable of expelling its contents. This was relieved by the catheter, and the rectum was kept clear by warm mild enemata, whilst the inflammatory symptoms were subdued by bleeding, opium, starvation, and rest. At the end of three months he was able to walk, but with some difficulty, on account of a defective power in one leg; some small piece of bone came away and the wounds closed, although he was subject to an occasional slight opening of the orifice of entrance, whence a little matter was discharged, when it again closed; he remained more or less lame until his death, which took place with the loss of the ship he commanded in a hurricane, on the coast of North America.

CASE 112.—A French soldier was wounded at the battle of Salamanca, by a ball, which entered by the side of the sacrum and lodged. Having been rode over and bruised, he was taken prisoner, and brought to me on the field of the battle, where I remained three days with the worst of the French and British wounded. From this wound he suffered comparatively little, except from a difficulty of making water. On the third day after his arrival at the San Carlos Hospital, or the sixth from the receipt of the injury, he passed the ball per anum. The wound quickly closed, and he aided his comrades as an orderly in the hospital afterwards.

CASE 113.—An officer was wounded near Bayonne, by a musket ball, on the left side, which passed through the ilium, across the pubes, making its exit through the gluteus maximus of the opposite side, but lower down. Urine flowed through both wounds at first very readily, but none of any moment came by the urethra, from which some blood occasionally oozed. The attempt to pass a catheter failed, although the desire to make water was urgent and painful. After a few days, the passage of urine by the external wounds became obstructed, apparently by the slough; great pain and mi-

sery were experienced; fever ran high; rigors and delirium followed extravasation of urine, and death closed the scene. The mischief here arose from the catheter not having been passed into the bladder, which could not be effected, from the prostatic part of the urethra or the neck of the bladder being injured.

This case required the catheter or staff to be passed down the urethra as far as it would go, when an incision should have been made upon it, as in the lateral operation for the stone, until the finger rested upon the wounded parts, when, in all probability, a straight catheter could have

been carried through them into the bladder. The urine would at all events, have had a direct passage outwards, instead of coming out of the bladder by the external openings. I advised the performance of this operation, but it was thought to be too late. I have seen other cases, at different times, under similar circumstances, in which it ought to have been done; and I leave my opinion on this point as a legacy to those who may follow me, for their observation, and I hope their instruction, and the advantage of their patients.

GENERAL CONCLUSIONS.

1. Severe blows on the abdomen give rise to the absorption of the muscular structures, and the formation in many instances of ventral hernia; which may in some measure be prevented during the treatment, by quietude, by the local abstraction of blood, and by the early use of retaining bandages.

2. Abscesses in the muscular wall of the abdomen, from whatever cause they arise, should be opened early; for although the peritoneum is essentially strong by its outer surface, it is but a thin membrane, and should be aided surgically as much as possible.

3. Severe blows, attended by general concussion, frequently give rise to rupture of the solid viscera, such as the liver and the spleen, causing death by hemorrhage. When the hollow viscera are ruptured, such as the intestines or the bladder, death ensues from inflammation.

4. Incised wounds of the wall of the abdomen of any extent, rarely unite so perfectly (except perhaps in the linea alba) as not to give rise to ventral protrusions of a greater or less extent.

5. As the muscular parts rarely unite in the first instance after being divided, sutures should never be introduced into these structures.

6. Muscular parts are to be brought into apposition, and so retained principally by position, aided by a continuous suture through the integuments only, together with long strips of adhesive plaster; moderate compression, and sometimes a retaining bandage.

7. Sutures should never be inserted through the whole wall of the abdomen, and their use in muscular parts under any circumstances is forbidden; unless the wound, from its very great extent, cannot be otherwise sufficiently approximated to restrain the protrusion of the contents of the cavity, the occurrence of which case may be doubted.

8. Purgatives should be eschewed in the early part of the treatment of penetrating wounds of the abdomen. Enemata are to be preferred.

9. The omentum, when protruded, is to be re-

turned, by enlarging the wound, through its aponeurotic parts if necessary, but not through the peritoneum, in preference to allowing it to remain protruded, or to be cut off.

10. A punctured intestine requires no immediate treatment. An intestine when incised to an extent exceeding the third part of an inch, should be sewn up by the continuous suture in the manner recommended, pages 26 and 27.

11. The position of the patient should be inclined towards the wounded side, to allow of the omentum or intestine being closely applied to the cut edges of the peritoneum. Absolute rest, without the slightest motion, should be observed. Food and drink should be restricted, when not entirely forbidden.

12. If the belly swells, and the propriety of allowing extravasated or effused matters to be evacuated seems to be manifest, the continuous suture or stitches should be cut across to a certain extent, for the purpose of giving this relief.

13. If the punctured or incised wound is small, and the extravasation or effusion within the cavity seems to be great, the wound should be carefully enlarged, and the offending matter evacuated.

14. A wound should not be closed until it has ceased to bleed, or until the bleeding vessel has been secured, if it be possible to do it. When it is not possible so to do, the wound should be closed, and the result awaited.

15. A gun-shot wound penetrating the cavity can never unite, and must suppurate. If a wounded intestine can be seen or felt, its torn edges may be cut off, and the clean surfaces united by suture. If the wound can neither be seen nor felt, it will be sufficient for the moment to provide for the free discharge of any extravasated or effused matters, which may require removal.

16. A dilatation or enlargement of a wound in the abdomen should never take place, unless in connexion with something within the cavity rendering it necessary.

17. When balls lodge in the bones of the pelvis,

they should be carefully sought for and removed, if it can be done with propriety and safety.

18. In a wound of the bladder, an elastic gum catheter should be kept in it, until the wound is presumed to be healed—unless its presence should prove injurious from excess of irritation, not removed by allowing the urine to pass through it by drops as it is brought into the bladder.

19. In all cases in which a catheter cannot be introduced, in consequence of the back part of the urethra or the neck of the bladder being injured,

an opening for the discharge of the urine should be made in the perineum.

20. The treatment of all these injuries must be eminently antiphlogistic, principally depending on general and local blood-letting, absolute rest, the greatest possible abstinence from food, and in some cases from drink, the frequent administration of enemata, and the early exhibition of mercury and opium, in the different ways usually recommended, with reference to the part injured.

APPENDIX.

CASE 114.—Private Samuel Fletcher, 31st regiment, wounded at Sobraon, on 10th February, 1846, died at Chatham, February, 1847. On opening the thorax, the greater part of the stomach, the transverse arch of the colon, and omentum were found in the left pleural cavity: this lung adhered very firmly and closely to the walls of the chest as low as the ninth rib, by adhesions of long standing. The lung was pushed to the upper part of the cavity, but on account of the adhesions to the ribs, it was compressed into a thin layer, which lined the walls of the thorax. The heart was also displaced, and lay behind and a little to the right of the sternum. The large curvature of the stomach, partly covered by omentum, lay in front, and first showed itself on opening the chest. The transverse arch of the colon was to the left of the stomach, and between it and the ribs; the stomach reached a little higher in the chest than the gut. There was an opening in the diaphragm, with rounded margin, $2\frac{1}{2}$ inches in diameter, 2 inches to the left of the œsophagus; the peritoneum lining the diaphragm proceeded through the aperture, and became continuous with the pleura. The serous surface around this opening, although smooth and uninterrupted was somewhat thickened, and had the appearance of old cicatrization. In the pleural sac, close to the opening in the diaphragm on its posterior and external margin, the stomach, colon, and omentum adhered firmly to the pleura covering the diaphragm and ribs, to the extent of a few inches. There were also two broad, thin, and loose bands of adhesions, about eight inches in length, stretching from the omentum to the base of the lung, and side of the pericardium. The stomach and colon were however loose and free in the pleural sac; the parts in the aperture of the diaphragm were free from adhesions, and not at all constricted, and the fingers were easily introduced through it, from the abdomen into the thorax. The œsophagus, after penetrating the diaphragm in the usual

place, took a sharp turn to the left side; the stomach then entered the thorax, a portion of the cardiac extremity of which still, however, lay in the abdomen in front, and to the right of the spleen; the larger part having entered the chest, curved round, and descended to the opening in the diaphragm; the pyloric orifice lay immediately in the aperture; about a foot and a half of the transverse arch of the colon, with the omentum attached, were also in that cavity. On the skin, exactly opposite, and corresponding to the opening in the diaphragm, were two old cicatrices, on the left side of the chest; one between the eleventh and twelfth ribs, close to the transverse processes of the vertebrae; and the other, between the eighth and ninth ribs, three and a half inches from their cartilages. The musket-ball, in its course through the thorax, must have wounded the diaphragm, and permitted the hernia of the stomach and colon. The structure of both was healthy. The posterior aspect of the right lung was attached to the chest by adhesions of long standing; the heart was of its natural size, and its structure healthy. On tracing the small intestines, five intus-susceptions were found, the first situated at a foot and a half from the duodenum, and the other four were generally from eight to ten inches apart; the portions intus-suscepted were in each about two inches; there was no vascularity or congestion in the intus-susceptions, or in any of the abdominal viscera. Both portions of the stomach, viz., the part in the chest and that in the abdomen, contained a quantity of dark fluid, mixed with portions of food and medicine. The duodenum, and upper part of the jejunum, as far as the first intus-susception, were distended with flatus. The small intestines below the invagination, although not distended, but in their normal condition, were coated with mucus, tinged with bile. The caput coli and ascending colon, to where it entered the chest, were distended, and contained a quantity of fluid and

hardened feces. The transverse arch of the colon was distended with flatus and some feculent matter. The descending colon and rectum were empty. Liver healthy; weight, three pounds, four ounces; spleen healthy; kidneys healthy;

weight of right, six ounces, three drachms; left, six ounces, two drachms. The parts forming the hernia are preserved, and placed in the Museum.

D. WILLIAMSON, *Staff-Assistant Surgeon.*

I have printed this case out of its proper place, that I might be able to record even one instance of a penetrating wound of the abdomen, from the four great battles lately fought in India; after which the man lived to return to England. It confirms the fact, first stated in a note, page 13, in my work on the Great Operations of Amputa-

tion at the Hip-Joint, &c. &c., that "Wounds of the diaphragm never unite (in consequence of the motion of the part), but always leave an opening, with rounded edges, through which herniæ of the stomach or intestines are apt to be formed, and sometimes become strangulated.

THE END.

SURGICAL WORKS by Mr. GUTHRIE.

- I. ON INFLAMMATION, ERYSIPELAS, MORTIFICATION, and on GUN-SHOT WOUNDS; on the INJURIES of NERVES, and of the EXTREMITIES, requiring the OPERATION of AMPUTATION at the HIP-JOINT, SHOULDER-JOINT, &c. Third Edition.
 - II. LECTURES on the TREATMENT of COMPOUND FRACTURES, and on the EXCISION of the EXTREMITIES of BONES.
 - III. INJURIES of the HEAD affecting the BRAIN.
 - IV. WOUNDS and INJURIES of the GREAT ARTERIES of the HUMAN BODY, with the OPERATIONS REQUIRED for their CURE.
 - V. ON ANEURISM, and on the DISEASES of ARTERIES, &c., being the substance of the Lectures delivered in the Theatre of the Royal College of Surgeons, when Professor of Anatomy and Surgery to the College.
 - VI. ON the ANATOMY and DISEASES of the BLADDER and the URETHRA; and on the OBSTRUCTIONS to which these PASSAGES are LIABLE.
 - VII. ON the OPERATIVE SURGERY of the EYE. A Critical Inquiry into the Operations required for the Cure of Cataract, &c. &c.
 - VIII. ON SOME POINTS CONNECTED with the ANATOMY and SURGERY of FEMORAL and INGUINAL HERNIA.
- A TREATISE on the WOUNDS and INJURIES of the CHEST will shortly issue from the Press, with a Compendious Edition of the Works out of Print, necessary to complete the record of the Surgery of the Peninsular War, with such Additions and Observations as time, and the improvements in Surgical Science, may have rendered necessary.

